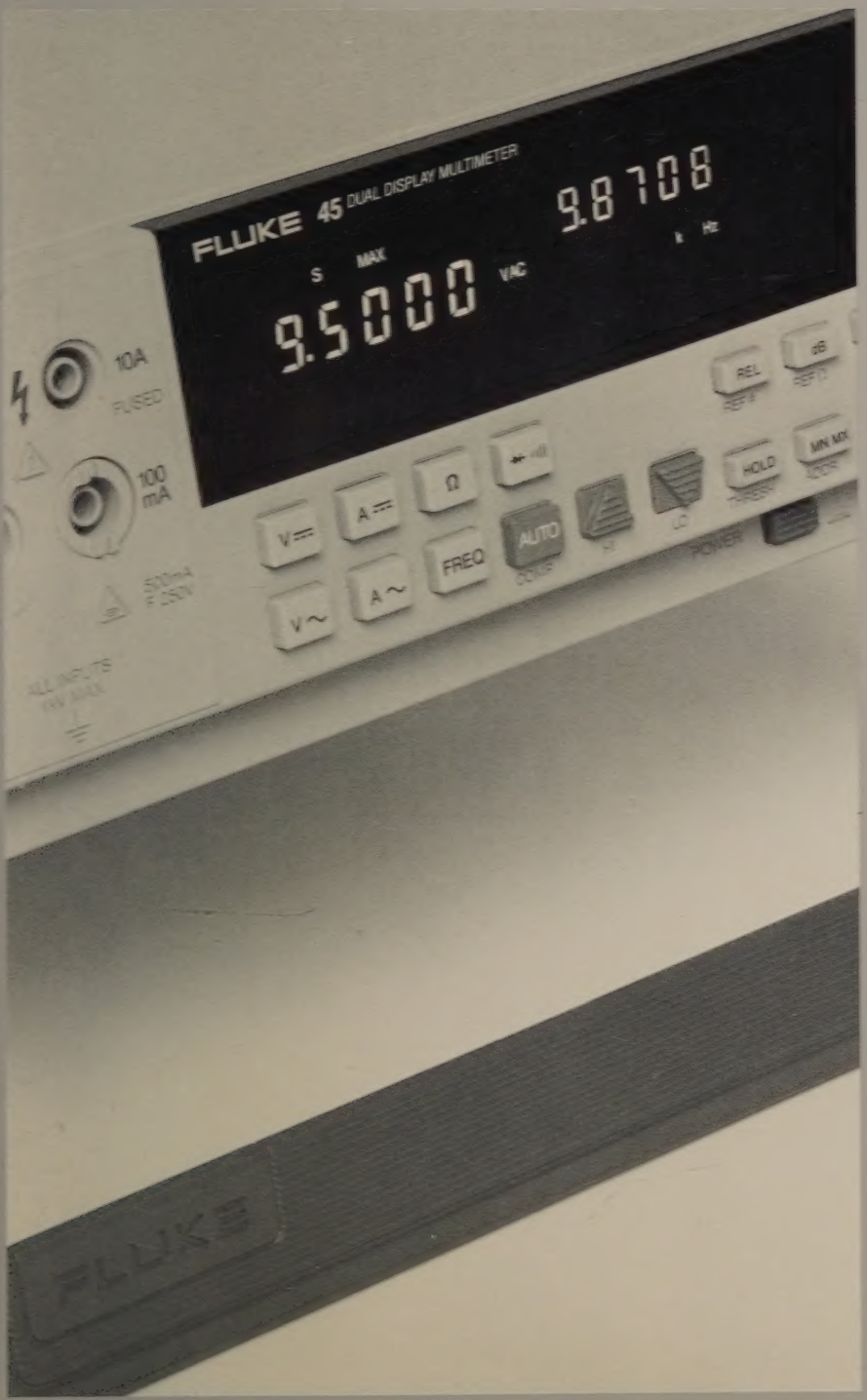
QUICKSTART 45®

IBM® PC SOFTWARE for the FLUKE 45

USER'S MANUAL



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FLUKE AND PHILIPS – THE GLOBAL ALLIANCE IN TEST & MEASUREMENT

QUICKSTART 45

IBM PC SOFTWARE for the FLUKE 45

USER'S MANUAL

P/N 868641
April 1989
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Section 1
Introducing QuickStart 45

INTRODUCTION

QuickStart 45™ is a menu-driven, software package that facilitates operating the Fluke 45 Dual Display Multimeter remotely from an IBM PC® (or compatible) over an RS-232 interface. It makes remote operation of the multimeter as easy as using the front panel buttons.

Some major features of the QuickStart 45 software are:

- RS-232 communication parameters (baud, parity, etc.,) are automatically matched, allowing a communication line between the PC and the Fluke 45 to be easily established.
- Fluke 45 functions can be selected from pull-down menus and commands sent to the Fluke 45 by a remote command generator, eliminating the need to learn the Fluke 45 remote command names and syntax.
- Time-stamped data can be stored in a format compatible with and accessible in common spread sheet programs.
- The multimeter can be queried for measurement updates automatically at a user-defined interval. Recorded data are automatically backed up.
- Data can be tested against user-defined limits, and a specified action can be taken when out-of-limit data is detected.
- Data can be displayed in an strip chart mode that provides a graphic representation of the data through time.
- Includes a built-in program editor, within which test programs can be written and modified.

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SYSTEM REQUIREMENTS

QuickStart 45 software is designed to run on the IBM PC®, PC-XT®, and PC-AT® or true compatibles. The software runs on systems under DOS version 2.1 or later. If you have an earlier version of DOS, you must update it before attempting to run QuickStart 45.

Using Compatible Hardware

If you intend to run QuickStart 45 on other than an IBM personal computer, the computer must meet the following criteria to be truly hardware compatible:

- QuickStart 45 communication drivers communicate directly with two components at the serial port:

  Intel® 8259A Programmable Interrupt Controller

  National Semiconductor® 8250 or 16450 UART

  All IBM systems and most compatibles use these parts, but if your compatible does not, QuickStart 45 may not communicate properly.

- QuickStart 45 screen drivers directly address the following standard IBM (or compatible) display boards:

  Standard monochrome display

  Enhanced Graphics Adapter (EGA)

  Color Graphics Adapter (CGA)

  Video Graphics Array (VGA)

If your system is compatible as described here, skip to "WHAT YOU SHOULD KNOW".

Alternative Screen Output

QuickStart 45 provides an alternative screen output that does not directly access the display board. Instead, the alternative output uses MS-DOS ANSI.SYS drivers.

To make use of the alternative screen output, install device drivers on the bootup disk. Include the following line in the CONFIG.SYS file:

DEVICE=ANSI.SYS

If ANSI.SYS was not specified in CONFIG.SYS at bootup, reboot so the PC will load the ANSI console driver.

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WHAT YOU SHOULD KNOW

QuickStart 45 is easier to master if you are already familiar with the general operation of the Fluke 45 and the IBM Personal Computer.

You should be able to do the following:

- Locate and interconnect the serial ports (RS-232 interface connector) on the PC and the multimeter.
- Plug in and turn on the PC, and load the operating system (DOS)
- Specify a path and filename (e.g., C:\QS45\QS.exe)
- Specify a pattern for matching (e.g., DIR A:*.TST)
- Change the active drive
- Use an editor program to add information to a file

You should also be able to use these DOS commands effectively:

- MKDIR (make directory, e.g., MKDIR C:\QS45)
- DIR (show directory listing)
- COPY (copy a file, e.g., COPY A:*.* C:\QS45)
- CD (change working directory, e.g., CD C:\QS45)

If you do not know how to perform the actions and use the DOS commands indicated above, refer to the appropriate sections of your computer's operation manual.

SETTING UP

First, make a backup copy of the QuickStart 45 disk and put the original away for safekeeping. Use the copy for day-to-day operations.

CAUTION

Memory Resident programs may cause a loss of serial data when running QuickStart 45. Your autoexec.bat file may be executing a program that stays active after returning automatically to DOS. It may be necessary to edit or remove the autoexec.bat file and reboot.

Connect the IBM PC serial port to the Fluke 45 using an appropriate cable.

- Use the Fluke RS40 terminal interface cable (DB-9 to DB-25 female connector) to connect the Fluke 45 multimeter to a PC, PC/XT, or PS/2.
- Use the Fluke RS41 modem cable (DB-9 to DB-25 male pins) if the multimeter is connected to a modem.
- Use both the Fluke RS40 and RS41 cables to connect the Fluke 45 to a PC/AT.

INSTALLING QuickStart 45 ON A HARD DISK

You can install QuickStart 45 on a hard disk to take advantage of its speed and convenience by performing the following procedure:

1. Change the default drive to the hard disk.

2. Make a directory on the hard disk by entering the DOS command line

   MKDIR QS45 ↵

3. Insert the QuickStart 45 disk into a drive and copy all files to the new hard disk directory.

   Assuming the floppy drive is drive A: and the hard drive is C:, the copy command would be:

   COPY A:.* C:\QS45* ↵

USING MENUS AND ENTRY FIELDS

Selecting From a Menu

To select a menu item from the Main Menu or a QuickStart 45 window, simultaneously press ⟨*ALT*⟩ and the key that corresponds to the upper case letter in the selection. For example, to select the Setup menu, press

⟨*ALT*⟩ *s*

To select a menu item within a submenu,

- use the arrow keys (↑ or ↓) to move the cursor to the desired selection, then press ↵ .

OR

- Press the key that corresponds to the upper case letter in the selection. For example, to select "Warning beeper" from the Setup menu, press "w".

Entry Fields

An "entry field" is a field on a screen or menu in which you can enter or edit information (e.g., filenames) or numerical values. Entry fields are easily identified because they are highlighted and you are prompted to enter a number or filename.

Follow a number or filename typed into an entry field with a ↵ or ⟨*ALT*⟩ *x*.

Table 1-1 summarizes the function of some of the keys (on IBM keyboards) frequently used when working in an entry field.

Table 1-1. Key Functions in Entry Fields

KEY	FUNCTION
⟨INSERT⟩	Toggles between Insert and Typeover modes.
⟨DELETE⟩	Deletes the character at the cursor position.
⟨BACKSPACE⟩	Deletes the character to the left of the cursor position.
⟨CTRL⟩ ⟨END⟩	Deletes all of the field to the right of the cursor.
← and →	Moves the cursor a character to the left or right.
⟨HOME⟩	Moves the cursor all the way to the left end of the field.
⟨END⟩	Moves the cursor all the way to the right end of the field.
⟨ESC⟩	Escapes to a higher level menu.

USING THIS MANUAL

QuickStart 45 is easy to use and so is this manual. The manual does not exhaustively explain every feature and menu item, but takes the form of an extended tutorial that demonstrates how to perform a series of operations. These operations introduce you to the menu structure of the QuickStart 45 software, explain what some menu items do, and teach you how to use them. To this extent, this manual is designed to be worked through rather than simply read through.

Assumptions

This manual makes the following assumptions about the configuration of the QuickStart 45 software and the Fluke 45.

- QuickStart 45 is configured as shipped from the factory.

  To ensure this, if a FLUKE_45.INI file (the QuickStart 45 initialization file) is in the current working directory, delete it. This file is written with filenames and configuration data each time QuickStart 45 is exited.

- The Fluke 45 has the print-only mode set to zero and "echo" turned on.

  If you are not sure whether the Fluke 45 is so configured, or you need to change the print-only or echo settings, refer to "RS-232 Print-Only Mode" and "Character Echoing and Deletion" in Section 5 of the Fluke 45 user's manual.

Conventions

The following conventions are used in this manual to help distinguish command line keystrokes from surrounding text.

CCC — Fluke 45 and QuickStart 45 command names are represented as all upper-case characters. However, these commands can be entered as any combination of upper- and lower-case characters.

Example: *FREQ2*

means type the command "FREQ2" in any combination of upper- and lower-case characters.

↵ — Means press the carriage return or enter key.

⟨XXX⟩ — Angle brackets enclosing all upper-case characters means press the "XXX" key.

Example: *⟨ESC⟩*

means press the "ESC" key

⟨XXX⟩ a — Angle brackets enclosing all upper-case characters, followed by a single alphanumeric character, means press the "XXX" and the single alphanumeric character ("a") simultaneously.

Example: *⟨ALT⟩ i*

means press and hold down the "ALT" key while pressing the "i" key.

⟨xxx⟩ — Angle brackets enclosing all lower-case characters indicates information to be provided by the user.

Example: *#IF ABOVE ⟨hhh⟩ ALERT LIMITS*

means enter a value for *⟨hhh⟩*, which, if exceeded, causes the alarm beeper to sound.

{XX | YY} — Braces enclosing upper-case characters, separated by a bar (|) indicates a series of keywords, one of which must be entered.

Example: *{ON | OFF | LIMITS}*

means enter either *"ON", "OFF" or "LIMITS".*

How This Manual is Organized

The QuickStart 45 manual is divided into sections that demonstrate how to perform specific, but related, tasks. Each section is summarized below:

SECTION 1. INTRODUCTION

Introduces QuickStart 45 and its manual and indicates system requirements.

SECTION 2. GETTING STARTED

Explains how to start QuickStart 45, get around in its menu structure, and establish a communication link with the Fluke 45.

SECTION 3. A GET ACQUAINTED SESSION

Takes you through an interactive measurement session, using the Interact and Chart Windows to introduce you to the basics of sending commands to the Fluke 45 remotely.

SECTION 4. EDITING A PROGRAM

Demonstrates how to use the editor to write or modify a measurement program. You will also be shown how to assign a program to a function key (⟨*F1*⟩-⟨*F10*⟩) and access it.

SECTION 5. ADDITIONAL PROGRAMMING FUNCTIONS

Describes other QuickStart 45 commands that allow you to call programs or routines, branch to designated program statements, and customize the startup sequence.

SECTION 6. ON THE WINDOWS AND MENUS

Provides a reference guide to items on the menu bar of each QuickStart 45 window.

Section 2
Getting Started

INTRODUCTION

Section 2 explains how to start the QuickStart 45 software, move around the menu structure, and establish a communication link with the Fluke 45 multimeter.

STARTING QuickStart 45 FOR THE FIRST TIME

Proceed as follows to load and start QuickStart 45:

1. Boot DOS.

2. Insert the QuickStart 45 floppy disk, and change the default drive to the one where QuickStart 45 is loaded.

3. To start QuickStart 45, type

   QS ↵

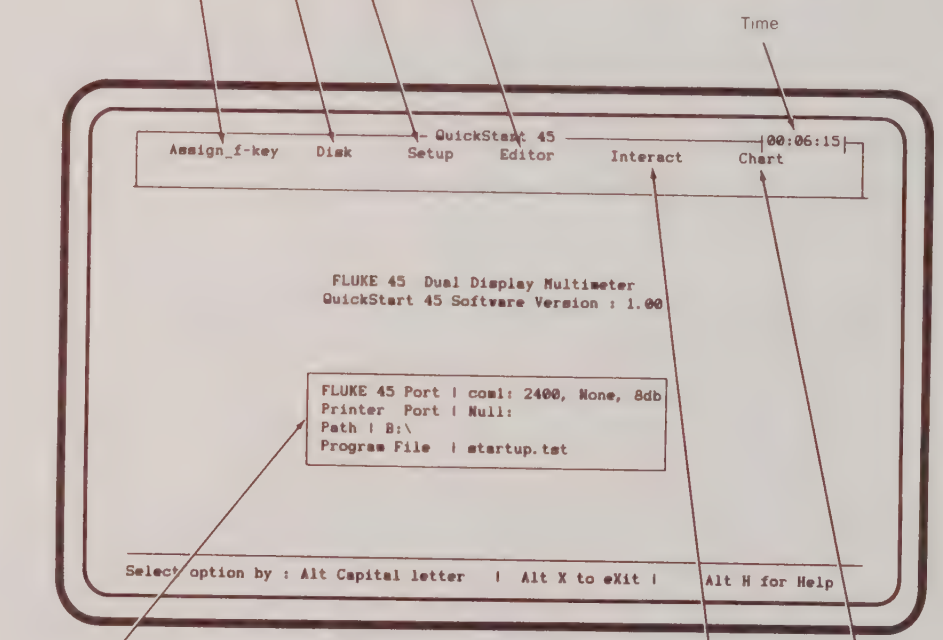
   (If you are using the ANSI drivers, start QuickStart 45 by typing QS -A ↵ .)

   The QuickStart 45 Main Menu appears as shown in Figure 2-1. From it, you can access DOS files utilities ("Disk"), make function key assignments ("Assign_f-key"), change setup parameters ("Setup"), and branch to the three other QuickStart 45 windows ("Editor", "Interact", or "Chart").

NOTE

If a menu other than the QuickStart 45 Main Menu appears, the default startup screen has been previously changed. Press ⟨ALT⟩ *x* ↵ *to return to the QuickStart 45 Main Menu.*

Notice the message bar at the bottom of the screen. It alerts you to the availability of a help screen ("Alt H for Help"), reminds you how to select an option ("Alt Capital letter"), and tells you how to exit ("Alt X to eXit").



⟨ALT⟩ a to select. Lets you assign measurement routines and programs to function keys (⟨F1⟩-⟨F10⟩). Help (⟨ALT⟩ h) is assigned to ⟨F3⟩, but can be assigned to any function key. The function key reminder display can match layout of your keyboard. (Refer to "ASSIGNING A PROGRAM TO A FUNCTION KEY" in Section 4.)

⟨ALT⟩ d to select. Accesses the Disk Operating System. This menu permits copying, deleting, printing, and viewing files without leaving QuickStart 45.

⟨ALT⟩ s to select. Allows you to customize the QuickStart 45 setup by: selecting the communication port between QuickStart 45 and the Fluke 45, selecting the printer port, enabling and disabling the warning beeper, setting the colors of QuickStart 45 screens, naming a default recording and startup file, and selecting the startup window.

⟨ALT⟩ e to select. Branches to Editor Window for creating and modifying test routines. (Refer to Section 4. "EDITING A PROGRAM".)

Time

Program Status Block

⟨ALT⟩ i to branch to Interact Window from which you can send Fluke 45 and QuickStart 45 commands to the Fluke 45 and receive responses back. Commands can be typed in from a keyboard, or make a menu selection and allow QuickStart 45 to generate the syntactically correct command. (Refer to "THE INTERACT WINDOW" in Section 3.) Commands and data, just the commands, or just the time-stamped data can be logged to a disk file for later editing or sent to a printer. The last 100 transactions of an interact session are available for screen reviewing.

⟨ALT⟩ c to branch to Chart Window in which data returned by the Fluke 45 are shown as a strip chart display. Rather than show complete command and response activity (like in the Interact Window), only a scaled representation of data is displayed. Measurements can be sent to a printer or saved to a file. A left and right boundary can be set for measurements taken from both the primary and secondary display. Change the left and right boundaries of the strip chart to rescale the display. (Refer to "USING THE 'CHART WINDOW' TO DISPLAY DATA AS A 'STRIP CHART'" in Section 3.)

Figure 2-1. QuickStart 45 Main Menu

EXITING QuickStart 45

"Alt X to eXit" means press and hold the ⟨*ALT*⟩ key, while simultaneously pressing "x" on your keyboard to leave a menu or, from the Main Menu, to exit the program.

If you exit from the Main Menu by pressing ⟨*ALT*⟩ *x*, you will save the QuickStart 45 setup and the initialization file (FLUKE_45.INI), leave the QuickStart 45 program, and return to DOS.

You can exit QuickStart 45 from any window by pressing "⟨*CTRL*⟩ *c*". If you exit in this manner, open files are closed, but the QuickStart 45 setup file is not changed.

IF A QuickStart 45 WINDOW DOES NOT APPEAR

If the QuickStart 45 window does not appear, make sure that you have:

- Loaded DOS Version 2.1 or later
- Used the correct command to start up QuickStart 45 (QS ↵)

OR

If the QuickStart 45 window does not appear and you started QuickStart 45 for the alternate display mode (QS -A ↵), make sure you have:

- Placed the ANSI.SYS device driver (if necessary) on the same disk as DOS. This must be the ANSI.SYS that was supplied with your system disk
- Booted the system with the CONFIG.SYS file specifying DEVICE = ANSI.SYS
- If odd characters seem to be filling the window, there is a problem with the ANSI.SYS driver. Be sure you have correctly configured the disk.

Until QuickStart 45 is running, any error messages come from the operating system.

Some monochrome PCs may display color poorly, causing the window to appear blurry or have little contrast. Correct for this by selecting monochrome as follows:

1. Press ⟨*ALT*⟩ *s* to select the "Setup" Menu.
2. Press "c" to select "Color selection". Then press "a" to select "All monochrome".
3. Return to the Main Menu by pressing ⟨*ALT*⟩ *x*.

You may have a defective disk if none of these corrects the problem. If you suspect a defective disk, make another backup disk of the QuickStart 45 software and try again.

USING ON-LINE HELP

Each time you start QuickStart 45 the message "⟨*Alt*⟩ *H* for Help" flashes in the lower right corner.

Press

⟨*ALT*⟩ *h*

to display the Help screen for the Main Menu. After reading the Help screen, press any key to return to the Main Menu.

On-line help is also available for the Interact, Chart, and Editor windows.

LINKING THE PC AND THE MULTIMETER

A communication port is set up from the "Setup" menu on the QuickStart 45 Main Menu.

To set up the Fluke 45 RS-232 port, be sure that the RS-232 port on the PC is cabled to the RS-232 connector on the rear panel of the Fluke 45, then proceed as follows:

1. Turn the multimeter ON.
2. At the QuickStart 45 Main Menu, press

   ⟨*ALT*⟩ *s*

   The Setup menu appears as shown in Figure 2-2.
3. You can select a menu item in one of two ways:

   - By moving the cursor to the desired selection using the up (↑) or (↓) arrow keys, and then pressing ↵ .

   OR

   - More easily, by pressing the key that corresponds to the upper-case letter in the selection.

   In this case, press "f" to select and display the "Fluke 45 port" menu.
4. Then press "1" (or "2"), depending on whether the Fluke 45 is connected to COM1 or COM2 on the PC, to select a communication port.
5. When the Setup menu reappears, press

   ⟨*ALT*⟩ *x*

   to exit and return to the Main Menu.

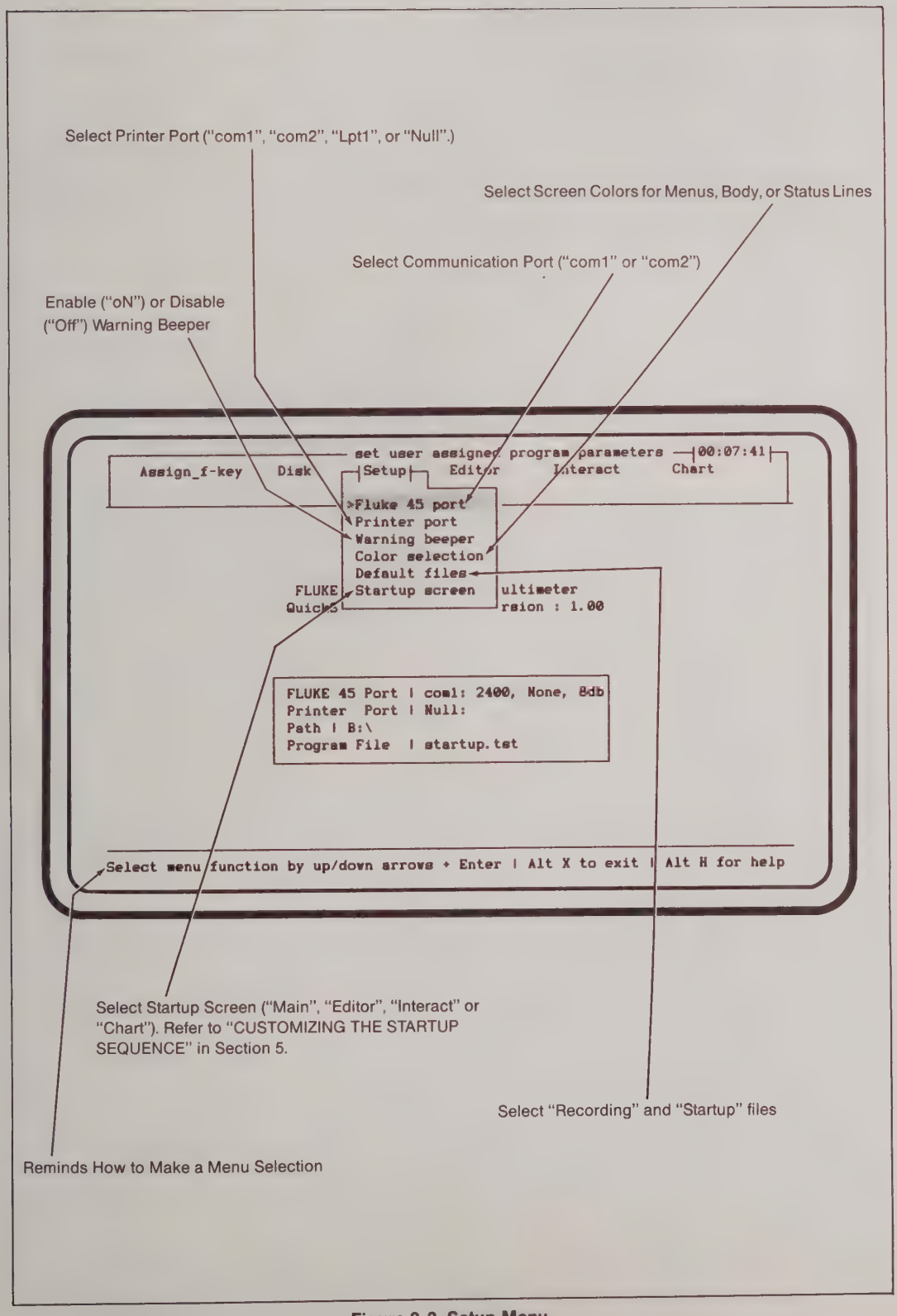

Select Printer Port ("com1", "com2", "Lpt1", or "Null".)
Select Screen Colors for Menus, Body, or Status Lines
Select Communication Port ("com1" or "com2")
Enable ("oN") or Disable ("Off") Warning Beeper
set user assigned program parameters
00:07:41
Assign_f-key
Disk
Setup
Editor
Interact
Chart
>Fluke 45 port
Printer port
Warning beeper
Color selection
Default files
Startup screen
FLUKE
ultimeter
rsion : 1.00
FLUKE 45 Port | com1: 2400, None, 8db
Printer Port | Null:
Path | B:\
Program File | startup.tst
Select menu function by up/down arrows + Enter | Alt X to exit | Alt H for help
Select Startup Screen ("Main", "Editor", "Interact" or "Chart"). Refer to "CUSTOMIZING THE STARTUP SEQUENCE" in Section 5.
Select "Recording" and "Startup" files
Reminds How to Make a Menu Selection

Figure 2-2. Setup Menu

WHAT YOU HAVE ACCOMPLISHED

You have now started QuickStart 45 and defined the communication link between the multimeter and the PC.

When the Fluke 45 is turned on, it sets itself to its power-up configuration. Although serial communication requires both devices to be set to the same communication parameters, you do not need to be concerned about this. When QuickStart 45 establishes a communication link between the PC and the multimeter, it automatically sets the PC's parameters to those of the Fluke 45.

Section 3
A Get Acquainted Session

INTRODUCTION

In Section 3 you will be walked through a "get acquainted" session with QuickStart 45. In this session you will send commands to the Fluke 45 and receive responses from it in the Interact and Chart windows.

THE INTERACT WINDOW

From the Interact Window, you can send remote commands to the multimeter and receive measurement data and configuration information in response. Commands can be selected from a "Meter" display that emulates the front panel of the multimeter, or they can be typed in at a keyboard.

Starting the Interact Window

Be sure the multimeter is turned on. Then select "Interact" from the menu bar of the QuickStart 45 Main Menu, by pressing

⟨*ALT*⟩ *i*

Then press ↵ "to confirm". (If you change your mind about selecting the Interact Window, press ⟨*ESC*⟩ or ⟨*ALT*⟩ *x*.) The Interact Window will appear as shown in Figure 3-1.

QuickStart 45 will attempt to establish communications with the multimeter. The message "communications established" or "communications failure" is displayed, indicating whether communications have been established between the Fluke 45 and the PC. (If "communications failure" is displayed, check to make sure the multimeter is turned on and connected to the selected communications port.)

The prompt

=⟩

on the command line means that the multimeter is ready to accept a command from the PC.

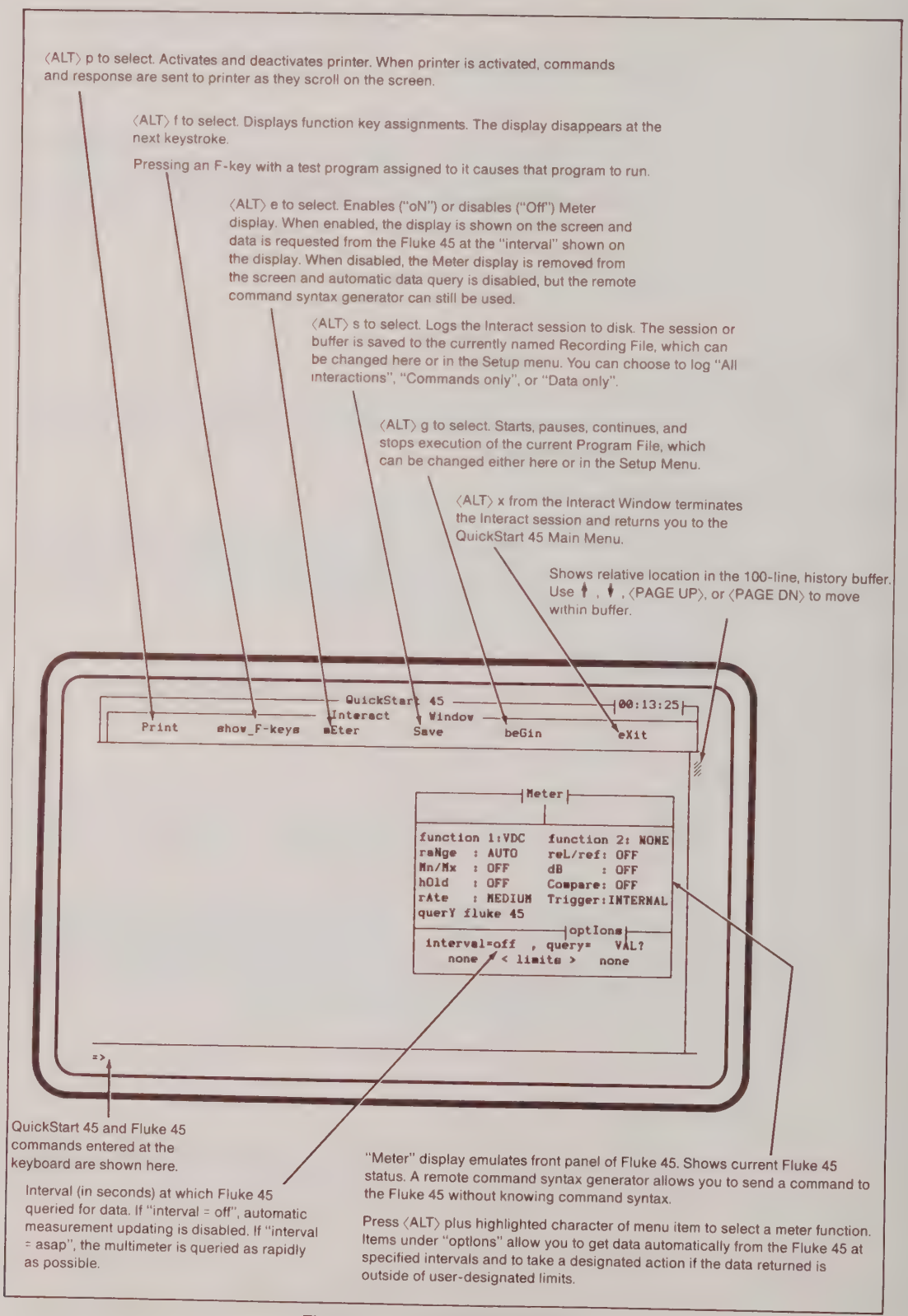

⟨ALT⟩ p to select. Activates and deactivates printer. When printer is activated, commands and response are sent to printer as they scroll on the screen.
⟨ALT⟩ f to select. Displays function key assignments. The display disappears at the next keystroke.
Pressing an F-key with a test program assigned to it causes that program to run.
⟨ALT⟩ e to select. Enables ("oN") or disables ("Off") Meter display. When enabled, the display is shown on the screen and data is requested from the Fluke 45 at the "interval" shown on the display. When disabled, the Meter display is removed from the screen and automatic data query is disabled, but the remote command syntax generator can still be used.
⟨ALT⟩ s to select. Logs the Interact session to disk. The session or buffer is saved to the currently named Recording File, which can be changed here or in the Setup menu. You can choose to log "All interactions", "Commands only", or "Data only".
⟨ALT⟩ g to select. Starts, pauses, continues, and stops execution of the current Program File, which can be changed either here or in the Setup Menu.
⟨ALT⟩ x from the Interact Window terminates the Interact session and returns you to the QuickStart 45 Main Menu.
Shows relative location in the 100-line, history buffer. Use ↑ , ↓ , ⟨PAGE UP⟩, or ⟨PAGE DN⟩ to move within buffer.
QuickStart 45
00:13:25
Print
show_F-keys
Interact
mEter
Save
Window
beGin
eXit
Meter
function 1:VDC
raNge : AUTO
Mn/Mx : OFF
hOld : OFF
rAte : MEDIUM
querY fluke 45
function 2: NONE
reL/ref: OFF
dB : OFF
Compare: OFF
Trigger:INTERNAL
options
interval=off , query= VAL?
none < limits > none
=>
QuickStart 45 and Fluke 45 commands entered at the keyboard are shown here.
Interval (in seconds) at which Fluke 45 queried for data. If "interval = off", automatic measurement updating is disabled. If "interval = asap", the multimeter is queried as rapidly as possible.
"Meter" display emulates front panel of Fluke 45. Shows current Fluke 45 status. A remote command syntax generator allows you to send a command to the Fluke 45 without knowing command syntax.
Press ⟨ALT⟩ plus highlighted character of menu item to select a meter function. Items under "options" allow you to get data automatically from the Fluke 45 at specified intervals and to take a designated action if the data returned is outside of user-designated limits.

Figure 3-1. The Interact Window

Getting Help

Each QuickStart 45 screen has a Help screen that summarizes its basic features. At this time, display the Help screen for the Interact Window by pressing

⟨ALT⟩ h

After reading the Help screen, press any key.

CONFIGURING THE MULTIMETER TO TAKE MEASUREMENTS

The following exercise demonstrates how to configure the multimeter to take measurements. The procedure below will configure the multimeter to take a volts ac reading in the primary display and a frequency reading in the secondary display:

1. Press

   ⟨ALT⟩ 1

   To select "function 1" from the Meter display.

   A "Function" menu is displayed on the Interact window.

2. Press the ↑ or ↓ key to scroll through the available functions.

   Notice that a description of each function is shown on a line at the bottom of the Meter display.

   Press the ↓ key until the "Volts" function is again highlighted. Then press ↵ to select volts.

3. When the "Function 1" menu is displayed. Press "a" to select "Ac".

   The command that sets the multimeter to volts ac for the primary display (e.g., VAC) is sent to the Fluke 45. QuickStart 45 queries the multimeter to determine its new status and updates the Meter display accordingly.

   =⟩VAC

   is shown above the command line, on the left side of the Interact Window. When

   =⟩

   reappears on the command line, the multimeter is ready to receive another command.

   You have just used the QuickStart 45 remote command generator, which allows you to send remote commands to the multimeter without having to memorize command names and syntax.

If the multimeter has the echo mode turned "off", the message

The FLUKE 45 is in ECHO OFF Mode

is displayed. In this case, QuickStart 45 displays the outgoing Fluke 45 function commands (e.g., VAC) as if they were echoed by the multimeter. However, commands that request data (e.g., VAL?) are not shown, providing a more condensed display. This manual assumes that echo is on. Refer to "Setting Communication Parameters (RS-232)" in Section 5 of your 45 user's manual to turn the echo mode "on".

4. A remote command can also be sent by entering it at the keyboard. (For a complete list and description of remote commands, refer to Tables 5-8 through 5-16 in your "45 User's Manual".)

   For example, if you know that the command to select the frequency function on the secondary display is "FREQ2", then you can type

   FREQ2 ↵

   (You could have made the same selection by pressing ⟨*ALT*⟩ *2*, and then selecting "frequency" on the "Function 2" menu.)

   The command can be entered in any combination of upper- and lower- case letters. In this manual, Fluke 45 commands are shown in upper-case letters so they are more easily distinguished from surrounding text.

   As the Meter display confirms, the frequency function (FREQ2) has now been selected for the secondary display.

You have now completed configuring the Fluke 45 to take a volts ac measurement in the primary display and a frequency measurement in the secondary display. The same method is used to select other multimeter functions and modifiers.

GETTING A MEASUREMENT FROM THE FLUKE 45

Now that the multimeter has been configured to take measurements, it can take a volts ac and frequency measurement and return them to the PC screen.

For demonstration purposes, measure line power as shown in the procedure below:

WARNING

USE EXTREME CAUTION. LETHAL VOLTAGES WILL BE PRESENT AT THE TEST LEADS TO THE MULTIMETER.

1. Check to make sure that the multimeter is turned on. Insert the test leads into the VΩ→⊢ and COM terminals. Then insert the test lead probes into a wall socket (or extension cord coming from a wall socket).

2. Press

   ⟨*ALT*⟩ *y*

   to select "querY fluke 45". The "Query 45" menu is displayed.

   The Query 45 menu allows you to get measurements and configuration information from the multimeter. See Table 3-1 for a description of items available on the Query 45 menu.

   Use the ↑ or ↓ key to scroll to "display Value(s), then press ↵ . Observe the screen. QuickStart 45 has issued the "VAL? command to the multimeter, which causes it to return the value shown on both the primary and secondary display.

Table 3-1. Query 45 Menu Items

MENU ITEM*	EQUIVALENT REMOTE COMMAND
display Value(s)	VAL?
primary display Value only	VAL1?
secondary display Value only	VAL2?
next Measurement value(s)	MEAS?
next primary Measurement value	MEAS1?
next secondary Measurement value	MEAS2?
Compare function results	COMP?
Identity	*IDN?
self Test status (0 = ok)	*TST?
Primary function assigned	FUNC1?
Second function assigned	FUNC2?
Reading rate	RATE?
Autorange status	AUTO?
present primary function raNge	RANGE1?
Trigger status	TRIGGER?
primary function Modifier code	MOD?
present Relative value	RELSET?
present dbRef table selection	DBREF?
present touch Hold threshold	HOLDTHRESH?
compare Low point	COMPLO?
compare High point	COMPHI?

* Pressing the upper-case letter scrolls (or steps) to an item with that letter in upper-case. For example, pressing "v" scrolls or steps to: "display Value(s)", or "primary display Value only", or "secondary display Value only".

When the multimeter executes the command and returns the voltage and frequency measurements, the display will look like Figure 3-2. The volts ac reading from the primary display is to the left of the comma, and the frequency reading from the secondary display is to the right.

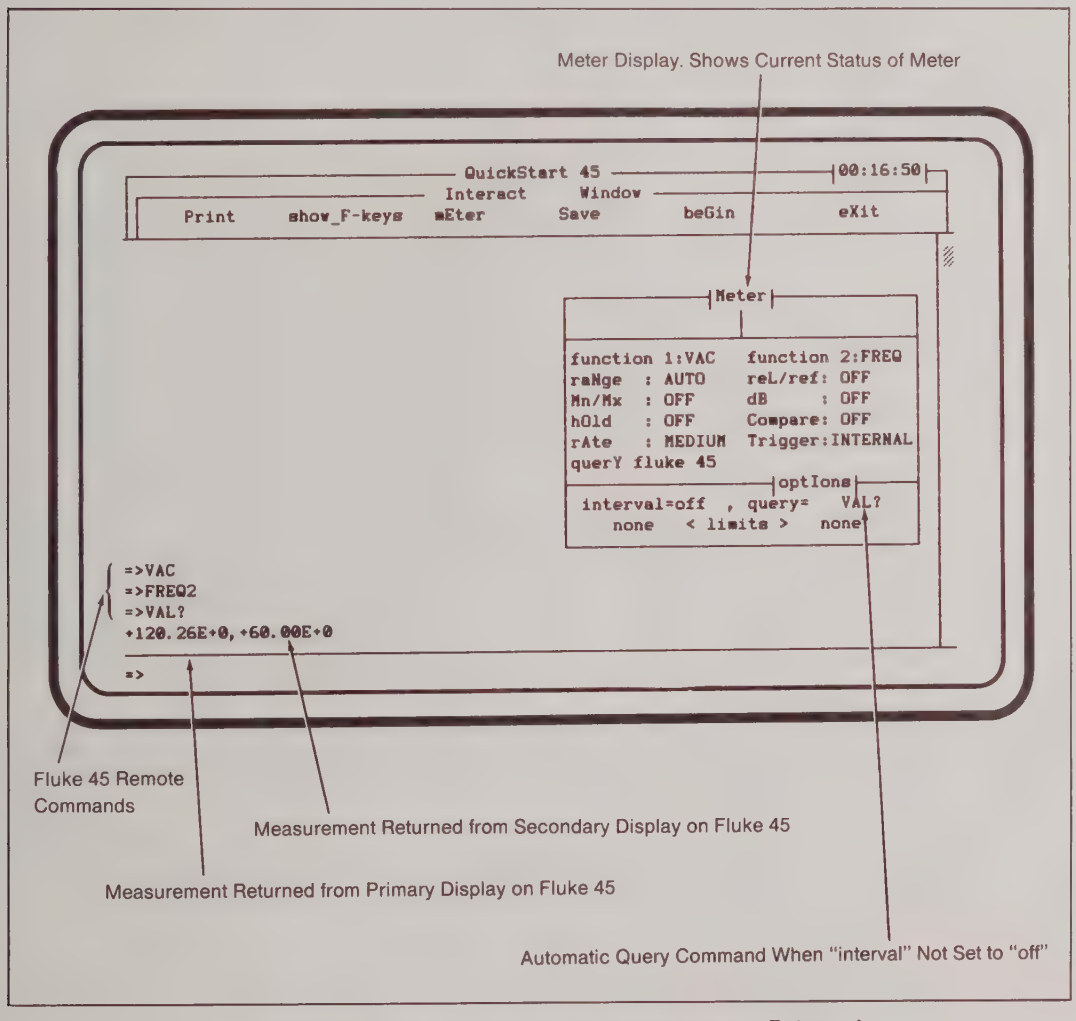


Figure 3-2. Interact Window After Measurements Returned

SENDING AN AUTOMATIC QUERY TO THE FLUKE 45

Each time the Fluke 45 is issued a valid query (a command ending with a question mark), it returns data. QuickStart 45 provides a way for you to query the multimeter automatically at a set interval, as demonstrated below:

1. Move to the Interact Window if you are not already there.

2. Press

   ⟨ALT⟩ i

   to select "optIons". The "Options" menu is displayed.

3. Press "i" to select "set Interval".

4. Enter

   10 ↵

   to set an automatic update interval of 10 seconds.

   #INTERVAL=10

   is shown along the left side of the screen.

   The Meter display reappears with "interval=10" shown. Notice that "query = VAL?" is shown on the same line, indicating that VAL? is the command is to be sent every 10 seconds.

   QuickStart 45 will continue to send a VAL? every 10 seconds until the interval is changed (or turned off), the Meter display is turned off, or you exit the Interact Window. Allow the multimeter to be queried for about a minute. The screen will appear about as shown in Figure 3-3.

   The returned measurement values are shown on the left side of the QuickStart 45 Window. Update measurements are also shown on the Meter display.

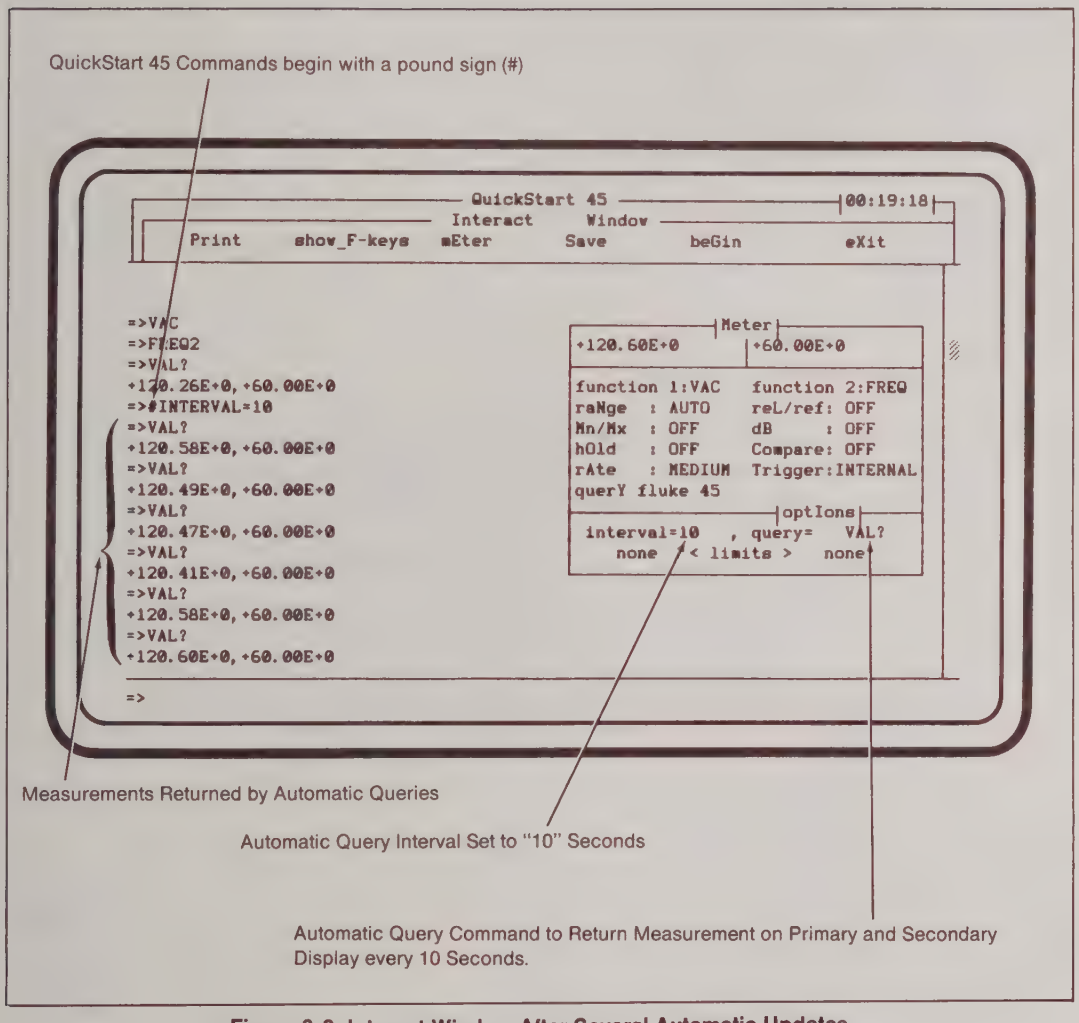


Figure 3-3. Interact Window After Several Automatic Updates

SAVING COMMANDS IN THE SESSION HISTORY BUFFER

Commands sent to the multimeter and data returned by it are stored in a session history buffer. The history buffer consists of the last 100 lines of a session in a QuickStart 45 window (e.g., Interact, or Chart). The buffer is cleared when you exit the window (⟨*ALT*⟩ x).

To save the commands in the history buffer, proceed as follows:

1. Press

   ⟨*ALT*⟩ s

   to select the "Save" menu.

   Notice the menu items. You can either choose to save what is currently in the buffer by selecting "save Buffer", or you can start saving everything coming into the buffer from this point on by selecting "Start saving".

2. Press "b" for "save Buffer", then "c" for "Commands only".

NOTE

If data are saved from the history buffer, the time stamp would be the same for each measurement, i.e., all measurements are recorded at the same time.

3. Type

   DEMO.PRO ↵

   (or a filename of your choice) in the entry field. You have now saved all commands in the history buffer for later editing.

CAUTION

QuickStart 45 reserves two names for its own use: "FLUKE_45.INI" and "TEMP_QS.DIR". "FLUKE_45.INI" stores values QuickStart 45 uses from one session to the next, like the screen colors and default file names. "TEMP_QS.DIR" is a temporary file created and deleted during QuickStart 45 operation.

SAVING DATA IN A RECORDING FILE

To save data returned from the Fluke 45, proceed as follows. These data can be imported into common spreadsheet programs.

1. From the Interact window, press

   ⟨*ALT*⟩ *s*

   to select the "Save" menu.

2. Then press "s" for "Start saving". When the next menu appears, press "d" for "Data only".

3. Type

   DATA.REC ↵

   (or a file name of your choice) in the entry field.

   Notice that the "Save" item on the menu bar has changed to a high-intensity "Save-on" to indicate that the recording file is open. Data received from this point on, along with the time it was recorded, are saved in the named file. Allow several readings to be displayed (and saved).

4. To stop saving data, press

   ⟨*ALT*⟩ *s*

   and, when the "Save" menu appears, press "q" for "Quit saving".

VIEWING SAVED DATA FROM THE MAIN MENU

Files can be viewed but not edited from the Main Menu. To view the recording file you just created, proceed as follows:

1. Press

   ⟨ALT⟩ x ↵

   to return to the Main Menu

2. Press

   ⟨ALT⟩ d

   to select the "Disk" menu.

3. From the Disk menu, press "s" for "Select file(s)". When prompted to "enter pattern", type in DATA.* ↵ (or whatever you named your recording file).

   *Reading B: \DATA.**

   is shown on the screen.

4. Move the cursor to the DATA.REC file position and press ↵

   asterisk (*) will be placed next to DATA.REC, indicating that it has been selected, and can be viewed, copied, deleted, or printed.

5. Press ⟨ALT⟩ x to return to the Disk menu.

   Then press "v" to select "View" and display the recording file.

   Data will appear, one line per query, as shown in the following example:

   11:23:54",+122.52E+0,+60.65E+0.

   "11:23:54" is the time stamp in hours, minutes, and seconds; "+122.52E+0" is the reading on the primary display; and "+60.65E+0" is the reading on the secondary display.

6. Press any key to return to the Disk menu. Then press

   ⟨ALT⟩ x ↵

   to return to the Main Menu.

USING THE "CHART" WINDOW TO DISPLAY DATA AS A STRIP CHART

In the Chart Window, data returned are displayed in a strip chart format that gives a graphic representation of data over time. While commands can be sent from the Chart window (just like in the Interact window) these commands are not displayed.

How Strip Chart Data is Displayed

In the Chart window, each measurement received from the Fluke 45 is displayed as a text character, whose value is indicated by its location on a scrolling graph. The character "p" represents a measurement returned from the primary display and "s" for a measurement from the secondary display. If the position for both the readings on the primary and secondary displays is the same, "b" is shown on the chart.

Importance of Boundary Settings

Strip chart readings are positioned between left and right boundaries set by the user. These boundaries define the scale. By resetting the boundaries, you can "zoom-in" and "zoom-out" on the scale. If the left and/or right boundaries are too small to allow the lowest and highest possible reading to be charted, some measurement readings will be off scale. Readings that are off scale are represented as capital letters ("P" for primary, "S" for secondary, or "B" for both).

Returning Measurements from the Chart Window

The following demonstration will introduce you to the basics of the Chart window:

1. From the QuickStart 45 Window, press

   ⟨*ALT*⟩ *c* ↵

   to select "Chart".

   The Chart Window is displayed as shown in Figure 3-4. Remember, if the update interval is still set to 10 seconds, QuickStart 45 will automatically start sending the Fluke 45 a VAL? command ever 10 seconds.

   If an update interval is not set when you enter the Chart Window, the following prompt is displayed on the screen:

   Use Alt_I to set an update interval

   The strip chart display is driven by measurements that are updated automatically at an interval defined by the user.

2. Press

   ⟨*ALT*⟩ *h*

   and read the Chart Window help screen.

3. You must now set the left and right boundaries of the chart display so that they are appropriate for the range(s) of the measurements being returned.

   Press

   ⟨*ALT*⟩ *d*

to select "Display".

When the "Display" menu appears, press "l" for "Left boundary".

The "Left boundary" entry field is displayed. The left boundaries for readings returned from the primary and secondary display are shown separated by a comma.

You can enter a single value followed by ↵, in which case this value becomes the left boundary for measurements from both the primary and secondary display. Or you can enter two values, separated by a comma, in which case the value to the left of the comma becomes the boundary of the primary display, and the value to the right of the comma becomes the boundary of the secondary display.

For this example, type

110,58 ↵

to set left boundaries of 110 and 58 for measurements returned from the primary and secondary displays, respectively.

Press

⟨ALT⟩ d

From the Display menu, press "r" for "Right boundary" and enter right boundaries of 150 and 62.

NOTE

These boundaries assume line voltage of approximately 120V and a frequency of approximately 60 Hz. If the line voltage voltage and frequency in your location are significantly different, you will have to change boundaries accordingly.

Notice that the line on the bottom of the screen indicates the boundary settings and scale values.

4. Now proceed to set the number of measurement lines separating each display of the scale.

Press

⟨ALT⟩ d

When the "Display" menu appears, press "s" to select "line per Scale".

A "lines per Scale" entry field is displayed, with the currently set value.

Type

10 ↵

(You would normally want this number to be larger, perhaps one per page if these values are being sent to a printer.)

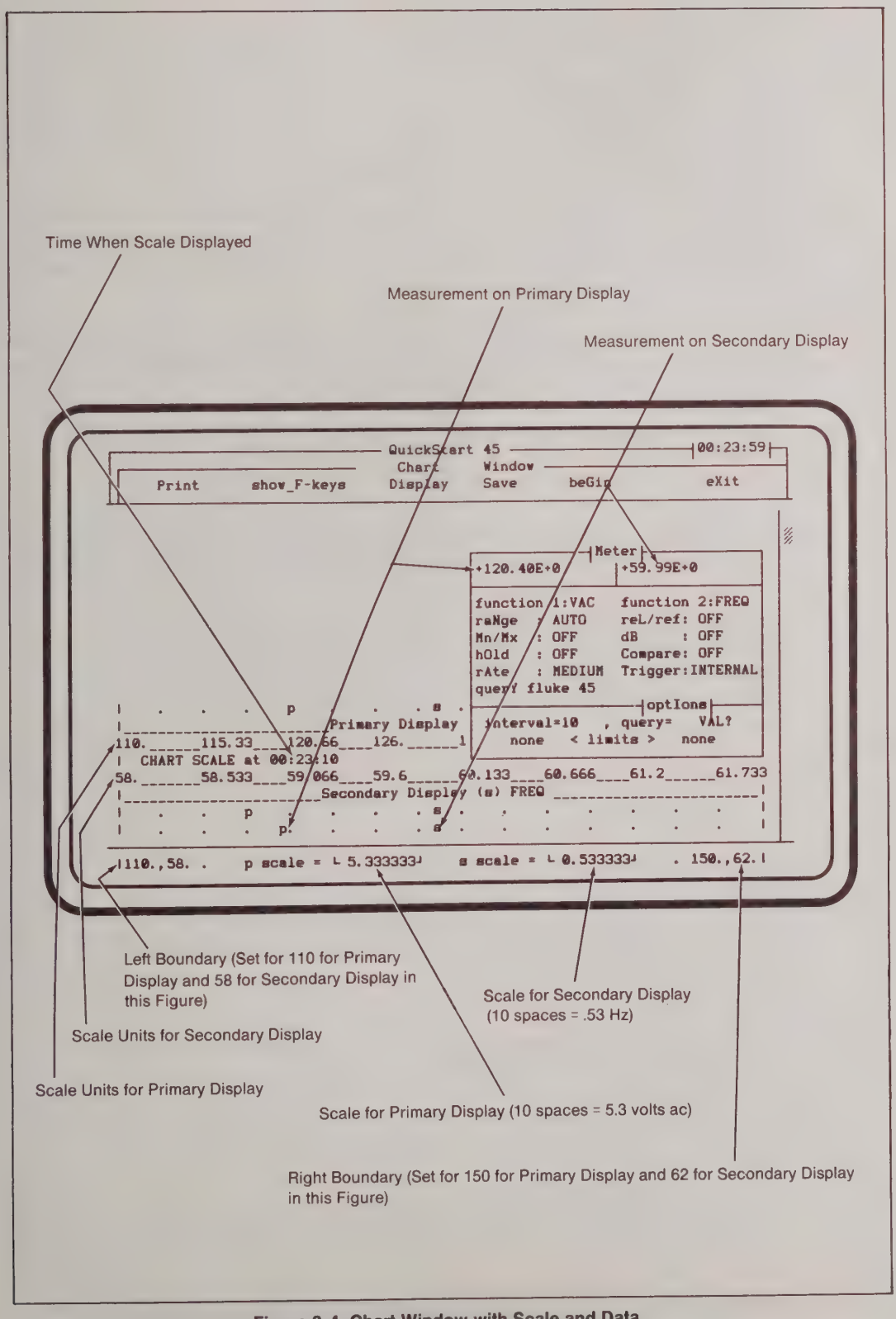


Figure 3-4. Chart Window with Scale and Data

5. As QuickStart 45 queries the Fluke 45, measurements are returned and plotted on the strip chart display. Allow measurements to be returned for a few minutes.

   Because the interval is set to 10 seconds, the chart scrolls up at the rate of one measurement every 10 seconds ["Time scale (seconds/line) =10"]. As each measurement is returned, it is also shown on the Meter display, giving you a more accurate reading than the strip chart display.

   Notice that the message area at the bottom of the display indicates left boundaries of "110,58" and right boundaries of "150,62". display are shown as "none". The value after "CHART SCALE at" indicates the time (hours:minutes:seconds) at which the scale was displayed.

6. Experiment a bit, setting different boundaries, intervals, and lines per scale to see what happens. Try setting the left and right boundaries to the same value, or setting the left boundary to a larger number than the right.

   After experimenting a while, type

   #INTERVAL=ASAP ↵

   QuickStart 45 will now repeatedly query the Fluke 45 as rapidly as possible. (If interval is set to "0", "none", or "off", the automatic query feature is turned off.)

   NOTE

   To change the command to be repeated: press ⟨ALT⟩ i for "optIons", press "y" to "select querY 45 to repeat", then make a selection. This automatic query selection remains until it is changed or until you leave QuickStart 45. At startup, automatic query selection is always reset to VAL?

7. Press

   ⟨ALT⟩ x ↵

   to exit the Chart Window and return to the Main Menu.

Outputting to the Printer from the Chart Window

Data can also be saved and output to a printer in a strip chart form, as demonstrated below:

NOTE

Do not perform this procedure if a printer is not connected to the PC. If you do so, you might lock up the PC.

1. If a printer has not been selected, move to the QuickStart 45 Main Menu and press

   ⟨ALT⟩ s

   to select "Setup". Press "p" to select "Printer port" from the Setup menu, then press "1" to select "Lpt1". Notice that "Lpt1" is shown as the "Printer Port" in the status box.

   Press *⟨ALT⟩ x* to exit the Setup menu and return to the Main Menu.

2. Press

   ⟨ALT⟩ c

   to return to Chart window.

3. From the Chart window, press

   ⟨ALT⟩ p

   to select "Print".

4. Then press "n" to activate the printer. "Print_on" is shown on the menu bar.

   Subsequent measurements will be output to the printer as shown in Figure 3-5.

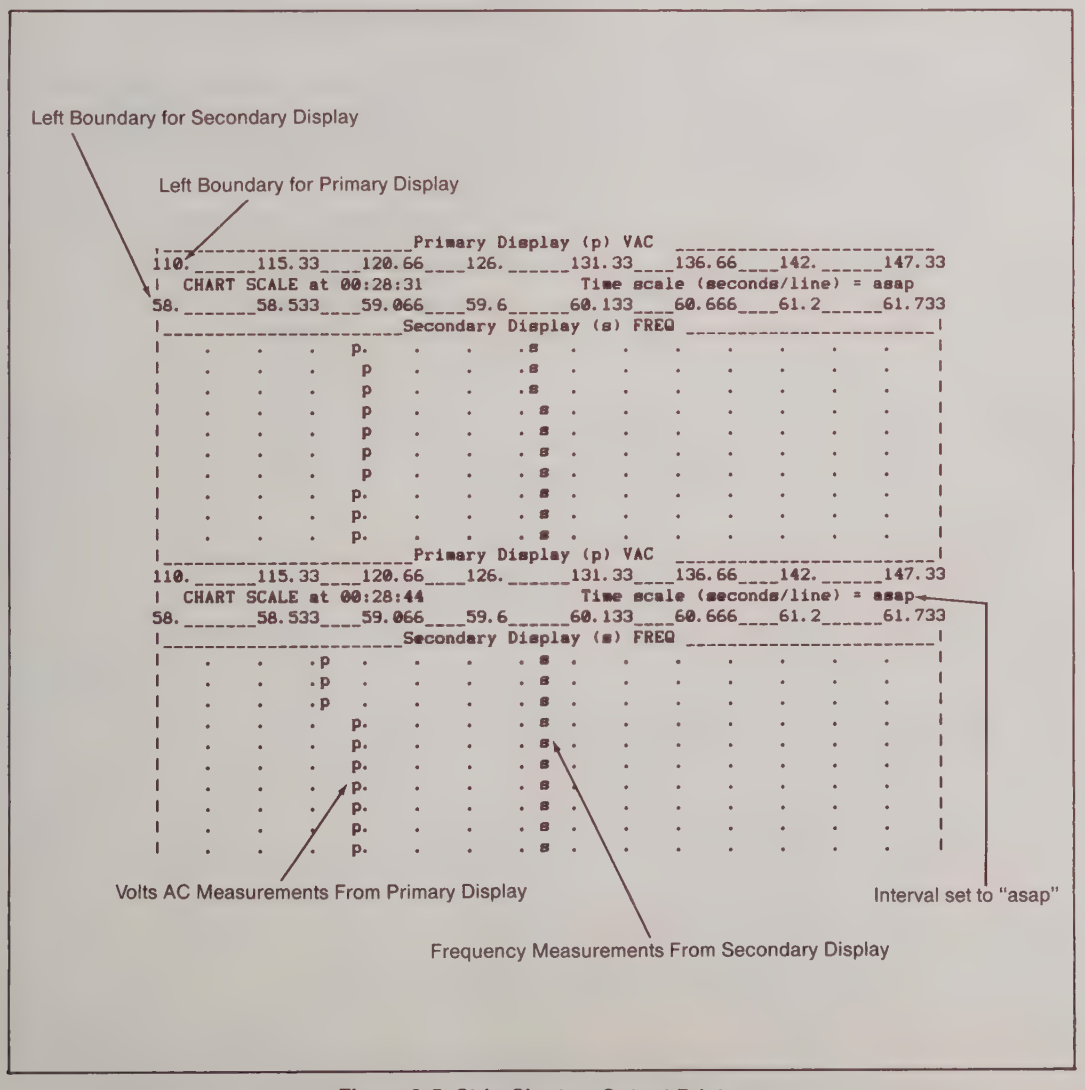

Left Boundary for Secondary Display
Left Boundary for Primary Display
Primary Display (p) VAC
110. 115.33 120.66 126. 131.33 136.66 142. 147.33
CHART SCALE at 00:28:31
Time scale (seconds/line) = asap
58. 58.533 59.066 59.6 60.133 60.666 61.2 61.733
Secondary Display (s) FREQ
Primary Display (p) VAC
110. 115.33 120.66 126. 131.33 136.66 142. 147.33
CHART SCALE at 00:28:44
Time scale (seconds/line) = asap
58. 58.533 59.066 59.6 60.133 60.666 61.2 61.733
Secondary Display (s) FREQ
Volts AC Measurements From Primary Display
Interval set to "asap"
Frequency Measurements From Secondary Display

Figure 3-5. Strip Chart as Output Printer

WHAT YOU HAVE ACCOMPLISHED

In Section 3, you performed most of the tasks needed to remotely configure the Fluke 45 and have it return a measurement. You have:

- Been introduced to the menu structure of the QuickStart 45.
- Established communication between the PC and the multimeter.
- Started the Interact Window, in which you used the QuickStart 45 remote command generator to send commands to the multimeter.
- Set QuickStart 45 to send the Fluke 45 a VAL? command every 10 seconds.
- Created a small program (DEMO.PRO) by saving the commands in the session buffer to a file.
- Stored measurements a recording file (DATA.REC) and viewed the file.
- Started the Chart Window, in which you displayed measurements as a strip chart.

In the next section, you will learn how to use the built-in editor to begin creating a more fully developed program.

Section 4
Editing a Program

INTRODUCTION

In Section 3 you worked through a "get acquainted" session in which you issued the Fluke 45 a series of commands that were saved as file DEMO.PRO.

In Section 4, you will learn how to use the QuickStart 45's editor to enhance this program. After the program has been edited, you will save the changes, assign the program to a function key, and run it. Assigning a program to a function key allows a user to run the program at a keystroke.

USING THE QuickStart 45 EDITOR

QuickStart 45 provides a simple editor within which you can write and modify programs. The editor allows you to insert, delete, or modify the following:

- Fluke 45 remote commands
- QuickStart 45 commands
- Programmer comments, operator messages, and branching labels.

NOTE

Programs written or edited with any text editor that saves files as ASCII can be run in QuickStart 45.

How the Editor Works

The editor provided with QuickStart 45 is a line-oriented editor. This means that each line is a single, complete Fluke 45 or QuickStart 45 command.

Starting the Editor

To start the editor, move to the QuickStart 45 Main menu and press

⟨ALT⟩ e

The "Editor" menu appears. Press "n" for "Name", and type in

DEMO.PRO ↵

in the entry field. (If "DEMO.PRO" is shown and highlighted, simply press ↵ .)

The editor starts and loads DEMO.PRO into the Editor Window as shown in Figure 4-1.

Begin by pressing

⟨*ALT*⟩ *h*

to display the Editor Help Screen. Read the Help screen. Then press any key to return to the Editor Window.

In the editor, the keys (on an IBM PC or compatible keyboard) listed in Table 4-1 function as described.

Table 4-1. Key Functions in the QuickStart 45 Editor

KEY	FUNCTION
⟨INSERT⟩	Toggles between insert and typeover modes.
←┘, ⟨ENTER⟩ or ⟨RETURN⟩	Breaks the line at the cursor. Everything to the right of the cursor forms a new line. If you press ← at the end of the line, a blank line is created, ready for entering a new command.
→	Moves the cursor to the right one character position.
←	Moves the cursor to the left one character position.
↑	Moves the cursor up one line.
↓	Moves the cursor down one line.
⟨PAGE UP⟩	Moves the cursor up in the buffer by one full page.
⟨PAGE DOWN⟩	Moves the cursor down in the buffer by one full page.
⟨END⟩	Moves the cursor to the right end of the line.
⟨HOME⟩	Moves the cursor to the left end of the line.
⟨DEL⟩	Deletes the character at the cursor position.
⟨CTRL⟩ ⟨END⟩	Deletes from the cursor to the right end of the line.
⟨BACK SPACE⟩	Deletes the character to the left of the cursor. If ⟨BACK SPACE⟩ is pressed when the cursor is at the left margin, the line with the cursor is appended to the line directly above it.

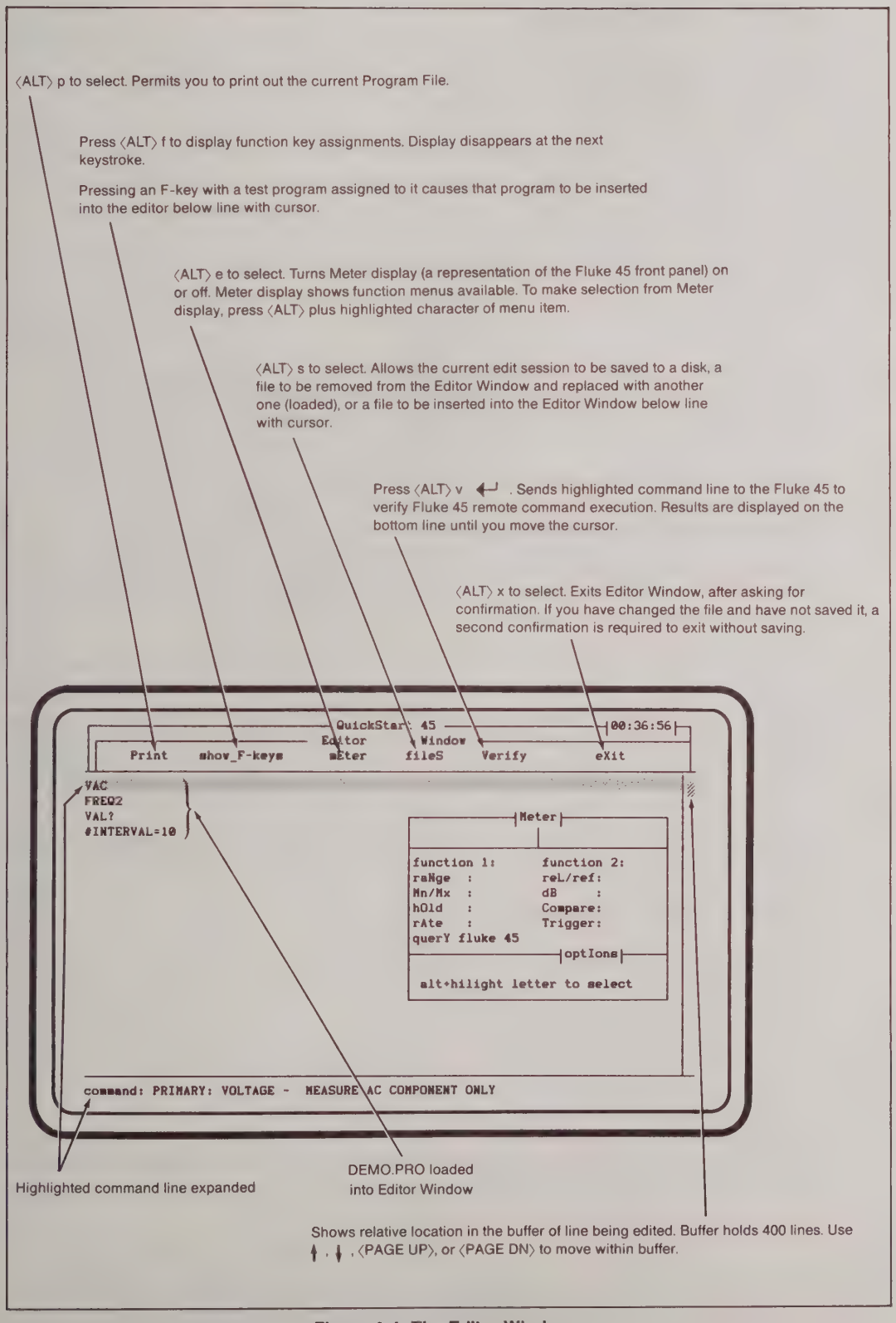

⟨ALT⟩ p to select. Permits you to print out the current Program File.
Press ⟨ALT⟩ f to display function key assignments. Display disappears at the next keystroke.
Pressing an F-key with a test program assigned to it causes that program to be inserted into the editor below line with cursor.
⟨ALT⟩ e to select. Turns Meter display (a representation of the Fluke 45 front panel) on or off. Meter display shows function menus available. To make selection from Meter display, press ⟨ALT⟩ plus highlighted character of menu item.
⟨ALT⟩ s to select. Allows the current edit session to be saved to a disk, a file to be removed from the Editor Window and replaced with another one (loaded), or a file to be inserted into the Editor Window below line with cursor.
Press ⟨ALT⟩ v ↵ . Sends highlighted command line to the Fluke 45 to verify Fluke 45 remote command execution. Results are displayed on the bottom line until you move the cursor.
⟨ALT⟩ x to select. Exits Editor Window, after asking for confirmation. If you have changed the file and have not saved it, a second confirmation is required to exit without saving.
QuickStart 45
00:36:56
Editor
Window
Print
shov_F-keys
mEter
fileS
Verify
eXit
VAC
FREQ2
VAL?
#INTERVAL=10
Meter
function 1:
raNge :
Mn/Mx :
hOld :
rAte :
queriY fluke 45
function 2:
reL/ref:
dB :
Compare:
Trigger:
optIons
alt+hilight letter to select
command: PRIMARY: VOLTAGE - MEASURE AC COMPONENT ONLY
Highlighted command line expanded
DEMO.PRO loaded into Editor Window
Shows relative location in the buffer of line being edited. Buffer holds 400 lines. Use ↑ , ↓ , ⟨PAGE UP⟩, or ⟨PAGE DN⟩ to move within buffer.

Figure 4-1. The Editor Window

"Expanding" Remote Commands

Notice that the highlighted line is "expanded" on the line at the bottom of the display into a brief description of the command. Press the ↑ and ↓ keys to demonstrate this feature.

When a new command line is inserted, you must move the cursor off the line and then put the cursor back on it before the new command line will be expanded.

Leaving the Editor Without Saving

You can leave the editor at any time without saving changes to the edited file by pressing

⟨ALT⟩ x ↵

If the file was changed but not saved, the following message is displayed:

EXIT without SAVING? (Y,⟨N⟩)

Press "y" to exit without saving, or press "n" to stay in the editor.

INSERTING PROGRAM STATEMENTS

To insert a program statement, position the cursor at the beginning or end of a program line and press ↵ . If the cursor was at the beginning of a line, a blank line is inserted above; if the cursor was at the end, a blank is inserted below.

A command can be inserted on the blank line by making a selection from the Meter display, or by typing the command in directly. If you insert a command by selecting it from the Meter display on a line that is not blank, the inserted command overwrites (from the location of the cursor) what is on that line. If you type in the command, it is inserted or overwrites, depending on whether the PC is in "typeover" or "insert mode" (see Table 1-1).

Use the editor, as shown below, to modify DEMO.PRO so that the reading rate of the multimeter is set to slow.

1. Move the cursor to the beginning of the file and press ↵ .

   A blank line is inserted above the cursor.

2. Move the cursor to the blank line and press

   ⟨ALT⟩ a

   to select "rAte". Then press "s" to set the reading rate to "slow".

   "RATE S" followed by a blank line is inserted. Press the ↓ button to move the cursor down and delete the blank line.

ADDING "ACTION" AND "LIMITS" STATEMENTS

QuickStart 45 supports unconditional actions that are executed on command and conditional actions that are executed only when a measurement returned from the primary and/or secondary display is above or below a set value. (Refer to Section 5 "ADDITIONAL PROGRAMMING FUNCTIONS" for a discussion of other "actions".)

A limit statement causes a conditional action to be performed when a measurement returned from the multimeter is above or below a user-designated value. Action and limit statements can be executed in the Interact and Chart windows, and inserted into a measurement routine in the Editor Window.

SETTING LIMITS

We will now use the editor to add a limit statement to DEMO.PRO that sets a high limit likely to be exceeded (for example, 119 volts for line power) and causes all measurements that exceed this limit to be time-stamped and logged to a "recording file".

1. Position the cursor at the end of the line after which you would like to insert a limit statement, and press ↵ . (Any line before the VAL? command will do. This insures that all measurements are tested against the limit.)

2. Press

   ⟨ALT⟩ i

   to select "optIons".

3. When the "Options" menu appears, press "l" to select "set emulation Limit options".

   The cursor will be on either "enter High limit" or "enter Low limit".

4. Press "h" to select "enter High limit".

   Type

   119.00 ↵

   in the "limit entry" field to set a high limit of 119.00.

   The "Limit Action" menu appears. Notice the actions that can be taken from this menu if the limit is exceeded.

5. Press "s" to select "change Save status". Then press "l" to select "Limits data only". The line

   #IF ABOVE 119.00 RECORD LIMITS

   is inserted, followed by a blank line.

   When this program is run, all measurements above 119.00V will be time-stamped and appended to the current recording file. (To change the recording file, refer to "Naming a Recording File" later in Section 4.)

6. After the last program statement, type

   #END ↵

   Move the cursor up a line and observe that "#END" is identified as "QuickStart 45 End of test statement".

7. When you are done, DEMO.PRO should look something like what is shown in Figure 4-2.

A different limit can be set for the primary and secondary display by entering two values, separated by a comma, after the "IF {ABOVE | BELOW}" statement.

For example, a limit statement in the form of

#IF BELOW 118.00,58 RECORD LIMITS

means if the reading in the primary display is below 118.00 OR the reading in the secondary display is below 58, save the out-of-limit reading in the recording file.

NOTE

If a program contains both an "IF ABOVE" statement and an "IF BELOW" statement, and a reading is above the primary display's high limit and below the secondary display's low limit simultaneously, the action designated by the "IF ABOVE" statement is performed. That is, primary limits are checked first; then secondary limits are checked. Only the first out-of-limit action is taken.

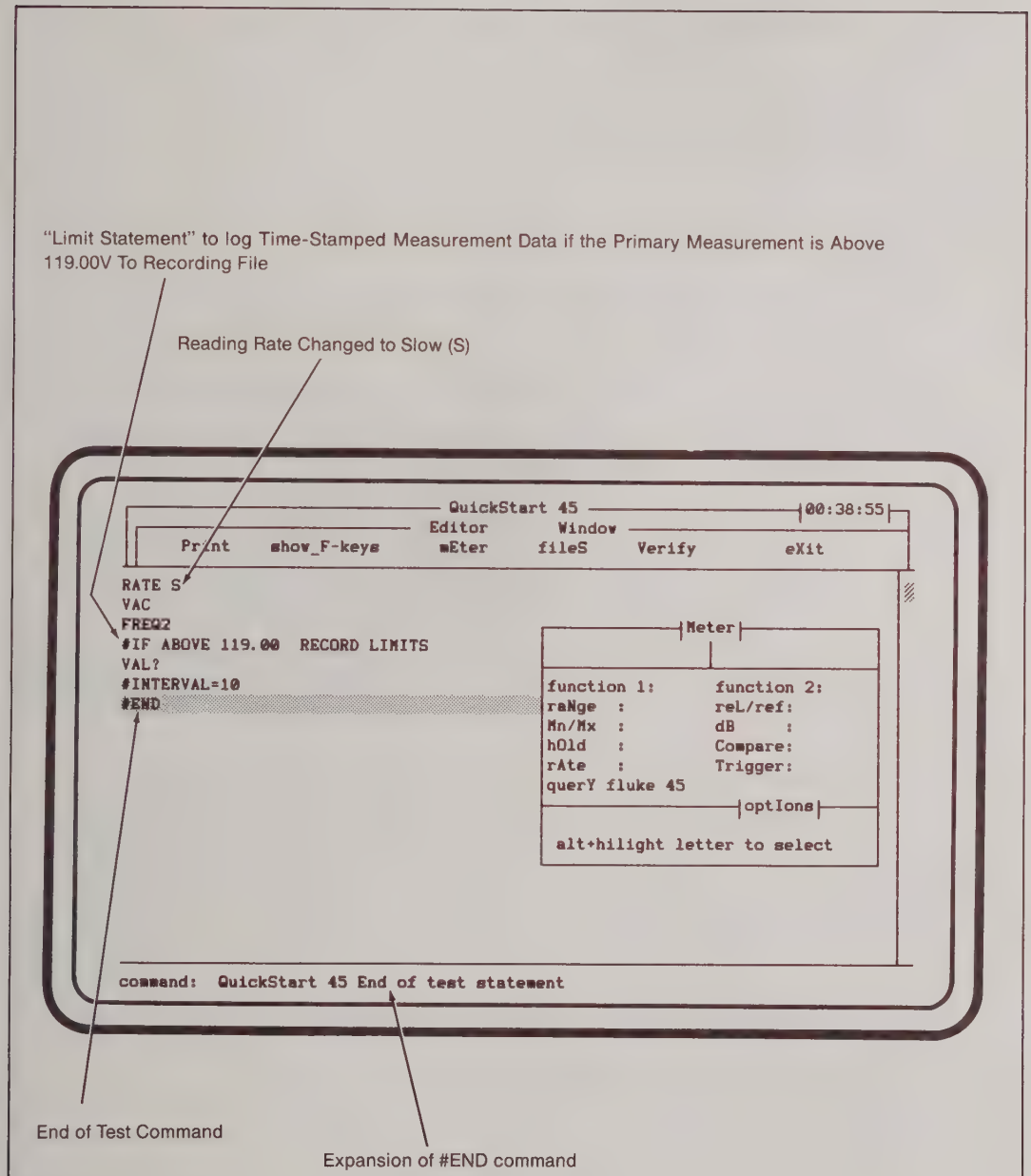


Figure 4-2. DEMO.PRO Modified Using Editor

ADDING PROGRAMMER COMMENTS AND OPERATOR MESSAGES

The following paragraphs define programmer comments and operator messages.

Programmer Comments

There are two types of programmer comments that are introduced in different ways:

- A programmer comment that is on a line by itself, which is preceded by a pound sign and two exclamation points (#!!).
- A programmer comment that is appended to a command string, which is preceded by two exclamation points only (!!).

Everything to the right of a program comment identifier is ignored when the program is run.

The following are valid comment lines:

#!! COMMENTS DO NOT DISPLAY WHILE THE PROGRAM IS RUNNING

#ALERT LIMITS !!BEEPER SOUNDS ALERT WHEN LIMIT EXCEEDED

If you forget to precede a comment by its identifier ("#!!" or "!!"), QuickStart 45 sends the line to the multimeter as a command string, which will result in an error message being generated.

Operator Messages

An operator message is any line preceded by a pound sign and a single exclamation point (#!).

Operator messages allow the operator to track the progress of the program. An operator message can be displayed, recorded, or printed, but it is never output to the Fluke 45.

The following, for example, is a valid operator message:

#!THIS MEASUREMENT SEQUENCE WILL TAKE 15 MINUTES.

Use the editor to add programmer comments and operator messages to DEMO.PRO.

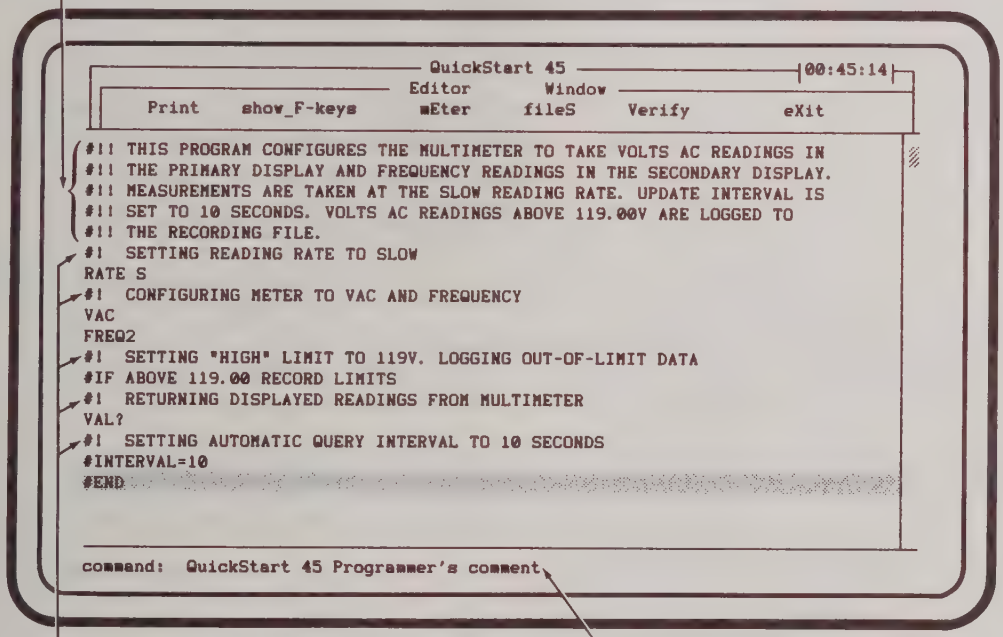
If you want to remove the Meter display from the screen before adding programmer comments and operator messages, press

⟨ALT⟩ e

for "mEter", then press "o" for "Off". Turn the Meter display back on before you run the program.

A final version of DEMO.PRO might look like Figure 4-3.

Programmer Comments. A programmer comment begins with pound sign and two exclamation points (#!!) on a line by itself, or with two exclamation points (!!) when part of a command line.


QuickStart 45
00:45:14
Editor
Window
Print
show_F-keys
mEter
fileS
Verify
eXit
#!! THIS PROGRAM CONFIGURES THE MULTIMETER TO TAKE VOLTS AC READINGS IN
#!! THE PRIMARY DISPLAY AND FREQUENCY READINGS IN THE SECONDARY DISPLAY.
#!! MEASUREMENTS ARE TAKEN AT THE SLOW READING RATE. UPDATE INTERVAL IS
#!! SET TO 10 SECONDS. VOLTS AC READINGS ABOVE 119.00V ARE LOGGED TO
#!! THE RECORDING FILE.
#! SETTING READING RATE TO SLOW
RATE S
#! CONFIGURING METER TO VAC AND FREQUENCY
VAC
FREQ2
#! SETTING "HIGH" LIMIT TO 119V. LOGGING OUT-OF-LIMIT DATA
#IF ABOVE 119.00 RECORD LIMITS
#! RETURNING DISPLAYED READINGS FROM MULTIMETER
VAL?
#! SETTING AUTOMATIC QUERY INTERVAL TO 10 SECONDS
#INTERVAL=10
#END
command: QuickStart 45 Programmer's comment

When you move the cursor to a new program line, QuickStart 45 "expands" (explains) that line and displays a short explanation of that command on the bottom line. In this figure, the cursor is on #END command line.

Operator Messages. Begin with a pound sign followed by single exclamation point (#!). These messages are displayed on the PC screen when the program is run from the Interact (but not the Chart) window.

Figure 4-3. Program as Modified and Documented in Editor (Meter Display Turned "Off")

VERIFYING THE SYNTAX OF FLUKE 45 REMOTE COMMANDS

The editor provides a quick and easy way to check the syntax of Fluke 45 remote commands (not QuickStart 45 commands). This feature can be used to check for syntax errors before you save and attempt to run the program.

To demonstrate this feature, move the cursor to a program line that contains a Fluke 45 remote command (e.g., VAL?) and press

⟨ALT⟩ v

to select "Verify" from the menu bar. Then press ↵ "to confirm."

The command is sent to the multimeter. If the program line is syntactically correct, the command is executed and the following message is displayed:

Verify is complete

The status of the multimeter after the command is executed is shown on the Meter display. The multimeter's response, if any, is shown on the command expansion line on the bottom of the screen.

If QuickStart 45 does not recognize the command as a Fluke 45 command,

Unrecognized command

is displayed on the command expansion line,

Not a Fluke command

is displayed in the center of the screen, and the verify operation is aborted.

Remember, in order to verify a command, the multimeter must be on. Otherwise, the following message is displayed:

..verifying.. no response

To complete verification, simply turn the multimeter on and repeat the verify procedure.

SAVING CHANGES TO EDITED FILES

To save changes made to an edited file, press

⟨ALT⟩ s

to select "fileS" from the menu bar, then press "s" to "Save file". When the entry field appears type in the filename followed by a ↵

NOTE

If you select "Insert new file" from the "fileS" menu, you will change the name of the program file to that of the inserted file. If you want to save this program under the original program file name, you will have to change the name of the program file accordingly.

If you save a file to an existing file, the existing file is overwritten without warning.

After the edited file has been saved, press

⟨ALT⟩ x ↵

to exit the Editor Window.

NAMING A RECORDING FILE

When you run DEMO.PRO, volts ac measurements above 119.00 will be logged to the current recording file. A recording file is a file to which data and/or commands can be saved.

A default recording file is set when you start QuickStart 45 and can be changed from the Main Menu. Alternatively, you can name a recording file in the Interact or Chart window from the "Save" menu before running a program.

To name the default recording file from the Main Menu, proceed as follows:

1. Move to the QuickStart 45 Main Menu if you are not there.

2. Press ⟨ALT⟩ s to select the "Setup" menu from the menu bar, then press "d" to select "Default files".

3. When the next menu appears, press "r" to select "Recording file".

   The name of the current recording file is shown.

4. Type in

   LIMIT.REC ↵

   (or some other name of your choice).

5. Press ⟨ALT⟩ x twice to return to the Main Menu.

ASSIGNING A PROGRAM TO A FUNCTION KEY

Assigning a program to a function key gives you ready access to the program at a single keystroke. A program can only be assigned to a function key from the QuickStart 45 Main Menu.

Assign the program DEMO.PRO to a function key as follows:

1. Move to the Main Menu if you are not already there.

2. Press

   ⟨ALT⟩ a

   to select "Assign_f-key".

   The function keys, with identifying names, are displayed in vertical or horizontal form as shown in Figure 4-4. (Press "h" or "v" to toggle between "Horizontal form" and "Vertical form".)

3. Press a function key (⟨F1⟩ through ⟨F10⟩) that is not assigned.

   An "Assign" menu appears. Notice the four menu items. Current information about the function key you pressed is displayed in a box in the middle of the screen.

4. Press "t" to select "to a 45_Test". You are prompted to enter the 45_Test file. Type

   DEMO.PRO ↵

   in the entry field.

   You are prompted to "enter name".

5. Type

   MYTEST ↵

   (or a name of your own choosing) for the function key to which DEMO.PRO is to be assigned.

   You are prompted to enter a "file description".

6. Enter a description of the file or test in the entry field, then press ↵ .

   The description, which should supply the operator with additional information about DEMO.PRO, can be a maximum of 22 characters.

7. To check that everything has been keyed in properly, press

   ⟨*ALT*⟩ *a*

   for "Assign_f-key". The function key display should show MYTEST on the key to which you assigned it.

   Press the function key to which you just assigned the program. The name and description you entered should be shown in the box in the middle of the screen.

   Press ⟨*ESC*⟩ to leave the entry unchanged.

QuickStart 45 retains function key assignments between sessions. The program assigned to a function key remains assigned to that key until you change it, cancel the assignment, or delete the FLUKE_45.INI file. Remember, if you delete, rename, or move a file assigned to a function key, QuickStart 45 will not be able to locate it.

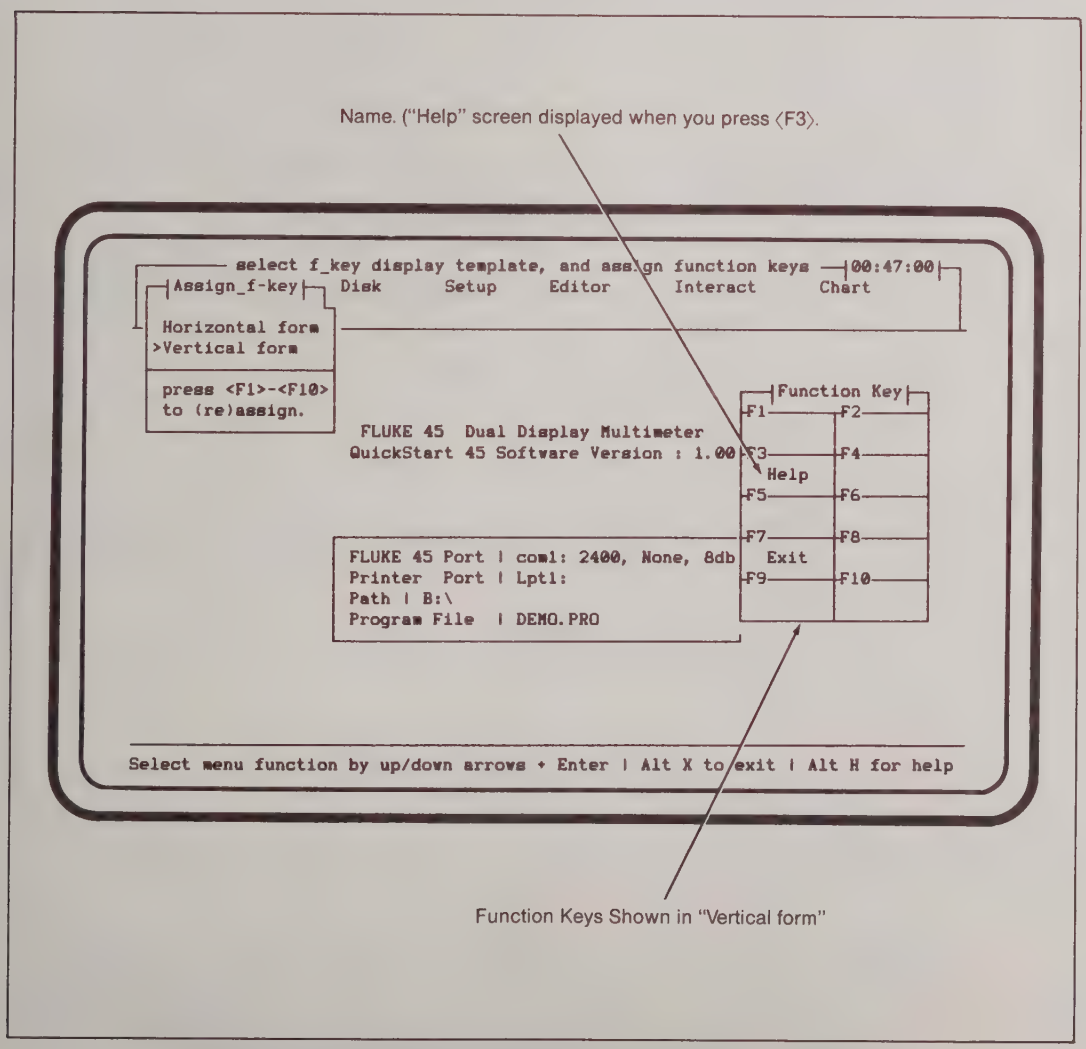


Figure 4-4. QuickStart 45 Main Menu with Function Keys Displayed

RUNNING A PROGRAM ASSIGNED TO A FUNCTION KEY

A program assigned to a function key can be run in the Interact and Chart Windows. (A program can also be run from the "beGin" menu in either the Interact or Chart Windows.)

Using a Function Key to Run a Program in the Interact and Chart Windows

In the Interact and Chart Windows, when a function key with a program assigned to it is pressed, the program assigned to that key is run. Pressing a function key with a program assigned to it is equivalent to pressing ⟨Alt⟩ g (beGin), s (Start), entering a filename, and ↵ .

Be sure the multimeter is turned on. Then try running the program you just assigned to a function key as follows:

1. From the QuickStart 45 Main Menu, press

   ⟨ALT⟩ i ↵

   to go to the Interact window.

2. Press

   ⟨ALT⟩ f ↵

   to select "show_F-keys" and turn the function key display on. (This step is not necessary if you know the key assignments.)

3. Then press the function key you assigned.

   While the program is running the word "beGin" on the menu bar is highlighted and followed by as asterisk (beGin*).

   All operator messages appear (but not programmer comments).

   When the statement

   #IF ABOVE 119.00 RECORD LIMITS

   is executed, "Save" on the menu bar changes to "Save_lmt" to indicate that out-of-limit data will be recorded. In addition, if the recording file LIMIT.REC already exists, the message

   Data will append to LIMIT.REC

   would be displayed.

   When the program has been executed, the message

   program COMPLETE

   is displayed momentarily, and "beGin" returns to normal intensity.

   The Meter display indicates that DEMO.PRO has changed the interval from its previous setting ("asap") to "10". Measurements continue to be returned even after the program has been executed because the automatic query feature is turned on (i.e., update interval is set to 10). As each new measurement is returned, it is shown on the screen readings and on the Meter display (if it is on).

NOTE

If the Meter display is not shown (turned off in the Editor and not turned back on?) no automatic updates are made. Press ⟨ALT⟩ e, then press "n" to turn meter display on.

4. Press

   ⟨ALT⟩ x ↵

   to exit the Interact Window.

If Your Program Does Not Run to Completion

If the program did not execute completely, check for the following common problems:

1. Is the multimeter turned on?

   If the multimeter is not turned on when you attempt to run a program,

   =⟩*no response*

   is shown on the command line.

2. Does the command line contain typographical or syntactical error(s)?

   If the multimeter does not recognize a command line as a valid Fluke 45 remote command, it returns

   ?⟩ command not recognized

   and

   program PAUSED on 45 command error

3. Is the multimeter properly configured to execute a measurement command?

   If the multimeter recognizes a command but cannot execute it when instructed to do so, it returns

   !⟩ command invalid at this time

   and

   program PAUSED on 45 command error

   This can occur, for example, if your program contains a COMP? (i.e., return the result of a comparison operation) when the multimeter has not been configured for the compare operation.

   To continue running a paused program, press

   ⟨ALT⟩ g

   for "beGin". Then press "c" for "Continue".

WHAT YOU HAVE ACCOMPLISHED

In Section 4 you have been introduced to the QuickStart 45 editor, and shown how to assign a program to a function key.

You have accomplished the following:

- Used the editor to add commands, comments, and messages to the program.
- Learned how to save changes made to an edited file or exit the editor without saving changes.
- Assigned a completed program to a function key (⟨F1⟩ through ⟨F10⟩) and run it.

Section 5
Using Additional Programming Functions

INTRODUCTION

To this point, you have learned how to move around the menu structure and use the menus and entry fields to configure the Fluke 45 and get data. You have also been introduced to the remote command generator, editor, strip chart display (Chart Window), and the use of "limits" to define conditional action statements.

Section 5 introduces you to commands and features that will allow you to call other programs, branch to labeled program statements, loop, and customize the startup sequence.

Additional QuickStart 45 "action" commands, which can be used to enhance test routines, are also explained. These action commands can be executed directly (e.g., *#RECORD ....*) or on a conditional basis (e.g., *#IF ... RECORD ....*).

CALLING ANOTHER PROGRAM OR ROUTINE

The command

#CALL ⟨name⟩

OR

#IF ... CALL ⟨name⟩

causes the program to pass control to the test routine designated by *⟨name⟩*. When the called routine is complete, control returns to the program that called it.

When a CALL is triggered by an out-of-limits condition (e.g., *#IF BELOW ... CALL ....*), QuickStart 45 disables subsequent limit CALLS. The test program will pause on the next out-of-limits condition unless another conditional statement resets the limit action as shown in the example below. (*RATESET.PRG* resides on the disc as a separate program.)

```
#IF BELOW 1.3 CALL C:\TEST\RATESET.PRG
   .
   .
   .
#END
```

```
#!! ***** PROGRAM RATESET.PRG *****
#!! CALLED TO SET RATE TO SLOW IF DATA BELOW 1.3
#! RESETTING RATE FOR GREATER ACCURACY
RATE S
#IF BELOW NONE NO ACTION !!CANCEL SUBSEQUENT LOW LIMIT ACTION
#END !!RETURN TO CALLING ROUTINE
#!!
```

PAUSING A SET INTERVAL

The command

#PAUSE ↵

OR

#IF ... PAUSE

causes the program to pause for number of seconds defined by the user-defined interval (*#INTERVAL=⟨seconds⟩*. If the interval is "0" or off, the program pauses until continued by the operator.

When a PAUSE is triggered by an out-of-limits condition, the program will pause until the operator selects "Continue" from the "beGin" menu.

USING LABELS

A "label" identifies a program statement to which the program will "branch" on the *#BRANCH ⟨label⟩* command.

A label can be up to 78 characters long and ends with a colon (:). Any command or programmer comment can also follow a label. The following, for example, is a valid label, followed by a programmer comment:

```
LOOP: !!THE PROGRAM LOOPS HERE EVERY 10 MINUTES
```

QuickStart 45 deletes leading and trailing spaces, so the following labels are equivalent:

```
LOOP : !! THE PROGRAM LOOPS HERE EVERY 10 MINUTES

LOOP: !! THE PROGRAM LOOPS HERE EVERY 10 MINUTES

LOOP:  !! THE PROGRAM LOOPS HERE EVERY 10 MINUTES
```

BRANCHING TO A LABEL

The command

#BRANCH ⟨label⟩

OR

#IF ... BRANCH ⟨label⟩

causes the program to branch to *⟨label⟩*.

The following commands, for example, cause the program to branch to the label "loop":

```
LOOP: !!BRANCH TO THIS STATEMENT
   .
   .
(Other program statements)
   .
   .
#BRANCH LOOP
```

"!!BRANCH TO THIS STATEMENT" is a programmer comment.

When a BRANCH is triggered by an out-of-limits condition (e.g., *#IF ABOVE ... BRANCH ....*), QuickStart 45 disables subsequent limit branching. The test program will pause on the next out-of-limits condition unless another conditional statement resets the branch action as shown below.

```
#IF ABOVE 2.3 BRANCH LABEL1
   .
   .
   .
RESTART:
   .
   .
#END
#!!
LABEL1: #!!PROGRAM WILL BRANCH HERE WHEN READING ABOVE 2.3
#! RESETTING RATE FOR GREATER ACCURACY
RATE S
#IF ABOVE 2.3 BRANCH LABEL1 !!RE-SET HI-LIMIT BRANCHING
#BRANCH RESTART !!CONTINUE PROGRAM AT LABEL "RESTART"
#!!
```

USING OTHER QuickStart 45 COMMANDS

The QuickStart 45 commands described below cause the actions indicated to be performed.

NOTE

If "LIMITS" is entered as a parameter, the action is performed only when measurement(s) above and/or below the designated limit(s) are returned.

- *#RECORD {ON|OFF|LIMITS}*

  OR

  #IF ... RECORD {ON|OFF|LIMITS}

  RECORD ON acts to save time-stamped data.

- *#PRINTER {ON|OFF|LIMITS}*

  OR

  #IF ... PRINTER {ON|OFF|LIMITS}

  PRINTER ON prints all commands and response. *PRINTER LIMITS* prints time-stamped data only.

- *#ALERT {ON|OFF|LIMITS}*

  OR

  #IF ... ALERT {ON|OFF|LIMITS}

  ALERT ON causes one beep per second to be emitted until any key is pressed. *ALERT LIMITS* causes one beep to be emitted for each out-of-limit response.

- *#INTERVAL=⟨seconds⟩*

  OR

  #IF ... INTERVAL=⟨seconds⟩

  sets the automatic update interval to ⟨*seconds*⟩.

- *#END* terminates the program.

EXAMPLE PROGRAM

The short program in Figure 5-1 demonstrates how some of these commands can be incorporated into a measurement routine that causes the meter to take five measurements every 10 minutes and writes these measurements to a recording file.

```
#!! THIS PROGRAM DEMONSTRATES HOW TO CREATE A MEASUREMENT LOOP BY
#!! BRANCHING TO A LABEL. FIVE QUICK MEASUREMENTS ARE MADE. THE PROGRAM
#!! THEN PAUSES FOR 5 MINUTES (300 SECONDS), THEN FIVE MORE MEASUREMENTS
#!! ARE MADE. THIS LOOP IS REPEATED UNTIL THE PROGRAM IS TERMINATED. ALL
#!! MEASUREMENTS ARE SAVED IN A RECORD FILE.
#!  CONFIGURING METER
RATE S
VAC
FREQ2
#! TURNING RECORD ON
#RECORD ON
#! SETTING INTERVAL TO 300 SECONDS (FIVE MINUTES)
#INTERVAL=300
#!!BRANCH TO "LOOP" EVERY FIVE MINUTES
LOOP:
#! TAKING FIVE VOLTS VAC AND FREQUENCY READINGS
MEAS?
MEAS?
MEAS?
MEAS?
MEAS?
#! PAUSING FOR FIVE MINUTES
#PAUSE
#BRANCH
#END
```

Figure 5-1. Program with Branching to a Label

CUSTOMIZING THE STARTUP SEQUENCE

QuickStart 45 allows you to customize the startup sequence to meet your specific needs. The following procedure demonstrates how to customize your startup sequence to:

- Go directly to the Interact Window (skipping the QuickStart 45 Main Menu top-level window) at startup.
- Load and run the DEMO.PRO program you have written.

Customizing your startup sequence in this way allows you to start taking measurements quickly by configuring the meter and loading and running a designated test routine as soon as QuickStart 45 is started.

Proceed as follows to customize your startup sequence:

1. Move to the QuickStart 45 Main Menu if you have not already done so.
2. Press

   ⟨ALT⟩ s

   to select the Setup menu.
3. Press "d" to select "Default files".

   From the "DEFAULT FILES" menu, press "s" to select "Startup file". When the entry field appears, type

   DEMO.PRO ↵

   You will recall that DEMO.PRO configures the meter to VAC in the primary display and FREQ in the secondary display, sets the reading rate to slow, sets the automatic query interval to 10 seconds, issues the multimeter a VAL?, and writes all measurements that exceed 119.00 volts to a recording file.
4. You now need to name a recording file. If you do not, the data recorded will be appended to the current recording file.

   From the DEFAULT FILES menu, press "r" to select "Recording file". When the entry field is displayed, enter the name of the recording file, followed by a ↵ .
5. Press

   ⟨ALT⟩ x

   to return to the Setup menu, and press "s" to select "Startup Screen".

6. From the "STARTUP SCREEN" menu, press "i" to select the "Interact" window. The message

   Next start of QS will begin on INTERACT

   is shown, and the Setup menu reappears.

7. Press ⟨*ALT*⟩ *x* twice to return to the QuickStart 45 Main Menu.

   Notice that the "Program File" identifier in the status box now shows "DEMO.PRO".

When you next restart QuickStart 45, if you have done every thing correctly, you will go directly to the Interact window, and DEMO.PRO will load and run.

BACKING UP RECORDED DATA AUTOMATICALLY

QuickStart 45 provides protection against loss of data due to power failure by automatically backing up the active recording file at a fixed interval. This interval (default 3600 seconds, i.e., once per hour) is loaded from the FLUKE_45.INI file.

The backup interval can be changed by editing the following line in the FLUKE_45.INI file:

timed backup interval in seconds:3600

For example, to change the automatic backup interval to 30 minutes, change this line to look like

timed backup interval in seconds:1800

If this file is changed using the QuickStart 45 editor, you must exit the program using a ⟨*CTRL*⟩ *c* (rather than ⟨*ALT*⟩ *x*) to preserve this change. If you exit the program using ⟨*ALT*⟩ *x*, QuickStart 45 will overwrite your changes. When you restart QuickStart 45, the backup interval will be loaded from the edited file.

CAUTION

Edit FLUKE_45.INI carefully. Line order and format are important. If this order or format is changed, when QuickStart 45 is started, a message will be displayed, informing you that the file has been corrupted. If this occurs, delete FLUKE_45.INI and restart the program.

Section 6
On the Windows and Menus

INTRODUCTION

Section 6 is a reference guide to pull-down menus on the menu bar of the QuickStart 45 Main Menu, and the Editor, Interact, and Chart Windows.

Each menu is listed by name, its function is described, and its items are summarized.

QuickStart 45 MAIN MENU (TOP-LEVEL)

The pull-down menus on the menu bar of the QuickStart 45 Main Menu are described in the following paragraphs.

Assign_f-key Lets you assign programs, routines, and files to a function key. The software comes with on-line Help (⟨*ALT*⟩ *h*) and Exit (⟨*ALT*⟩ *x*) assigned to ⟨*F3*⟩ and ⟨*F7*⟩, respectively. (These can be reassigned to other keys.)

Horizontal form/Vertical form

Lets you set the function key display to a horizontal or vertical arrangement.

press ⟨F1⟩-⟨F10⟩ to (re)assign

Initiates the process of changing a function key assignment. A file, name, and description can be assigned to each function key. These are shown when the status of a particular key is displayed.

Disk Provides gateway to DOS (for file access) without leaving QuickStart 45. Permits copying, deleting, printing, and viewing files.

Select file(s)

Selects files to be deleted, copied, printed, or viewed. QuickStart 45 prompts for a pattern and will accept wildcard characters. Files matching the pattern are displayed in the menu area.

Press ↵ at a highlighted filename to select the file. A selected file is marked with an asterisk (*). Multiple files can be selected. Press ⟨*ALT*⟩ *x* to end file selection and return to the Disk menu, from which you choose the operation to be performed on the selected file(s).

Delete

Deletes all marked files.

Copy

Copies the marked file(s). QuickStart 45 prompts you for a destination filename. When the destination is a device or directory, all selected files are copied there without a name change. In any copy operation, a destination file with the same name as the source file is overwritten without warning.

Print

Sends the selected file(s) to the printer port.

View

Displays the selected file(s).

Setup

Changes the parameters that control communication between QuickStart 45 and the Fluke 45, selects the printer, enables and disables the warning beeper, determines the colors of QuickStart 45 screens, establishes the default files that QuickStart 45 uses for testing and recording, and selects the startup screen.

Fluke 45 port

Sets the communication port between the PC and the Fluke 45 to COM1 or COM2.

Printer port

Selects the printer port QuickStart 45 uses.

Warning beeper

Enables and disables operation of the PC beeper.

Color selection

Sets the background colors for the menu bar and Meter display, screen body, and status/entry line. QuickStart 45 automatically changes the foreground colors. For best results with monochrome monitors, choose "All" to select monochrome for all three areas.

Default files

Sets the default "Program" and "Recording" files.

If the Interact or Chart window is selected as the Startup screen, the program file will be executed automatically when QuickStart 45 is started.

The default recording file is the file set at startup, to which recorded data will be saved.

Startup Screen

Sets the window to which QuickStart 45 goes at startup. The four options are: "Main", "Editor", "Interact", and "Chart".

Editor

Accesses the Editor window, a QuickStart 45 text editor for creating and modifying test routines. (Refer to "EDITOR WINDOW" below for a description of pull-down menus.)

Interact

Accesses the Interact window, which performs like a powerful terminal emulator. Fluke 45 and QuickStart 45 commands can be entered at the keyboard or selected from a sequence of pull-down menus. (Refer to "INTERACT WINDOW" for a description of pull-down menus.)

"All interactions", "Commands only", or "Data only" can be logged to file. Saving "Commands only" is a way to quickly create a test program from a session in the Interact window.

The last 100 interactions of a session constitute a history buffer and are available for screen reviewing. The buffer is cleared when you exit the Interact Window. This buffer can be saved to a file.

Chart

Accesses the Chart window. Measurements will be displayed in a strip chart form. (Refer to "CHART WINDOW" below for a description of pull-down menus.) No commands are displayed.

EDITOR WINDOW

The pull-down menus on the menu bar of the Editor window are described in the following paragraphs.

Print

Sends the edited file to the printer after prompting for a confirmation. The printer port must already be selected from the Setup menu on the QuickStart 45 Main Menu.

show_F-keys

Displays the function key assignments. The display disappears at the next keystroke.

Pressing a function key with a test program assigned to it causes that program to be inserted below the highlighted line.

mEter

Turns the Meter display "oN" or "Off". The Meter display remains in "oN" or "Off" until it is reset.

Press ⟨*ALT*⟩ plus the highlighted letter or number to make a selection from the Meter display. Selections generate syntactically correct Fluke 45 commands.

When the Meter display is "Off", you can still use the remote command generator to generate commands.

fileS

Allows you to save the current edit session to a file, remove the current edit file and load another one, or insert a new file into the edit window on the line below the cursor.

Verify

The highlighted command line, if a recognized Fluke 45 command, can be sent to the Fluke 45 to verify the full command syntax.

Move the highlight to the desired line using the arrow keys, then select Verify to send the command line to the Fluke 45. Results are displayed on the bottom line and on the Meter display.

eXit

Leaves the Editor window and returns you to the Main Menu, after asking for confirmation.

If the file has changed since you last saved it, you are reminded that the file has not been saved and are allowed to abort the option and stay in the Editor Window, or complete the exiting process without saving any changes made to the file.

INTERACT WINDOW

The pull-down menus on the menu bar of the Interact window are described in the following paragraphs.

Print

Activates ("oN") or deactivates ("Off") printer. "Print_on" is shown when the printer is activated.

When the printer is activated, lines on the screen are sent to the printer.

show_F-keys

Displays the function key assignments. The display disappears at the next keystroke.

Pressing a function key with a program assigned to it causes that program to be executed immediately. It is the equivalent of pressing ⟨*ALT*⟩ *g* (beGin), pressing "s" (Start), and entering a filename.

mEter

Turn the Meter display "oN" or "Off". The Meter display remains "oN" or "Off" until it is reset.

The Meter display emulates Fluke 45 front panel operations. By making selections from the menu, you can operate the multimeter remotely without having to know the proper remote command syntax.

Press ⟨*ALT*⟩ plus the appropriate highlighted letter or number to activate a meter function menu.

When the Meter display is on, multimeter configuration and status are shown on the display. The Meter display is updated each time a command is issued that might change the Fluke 45's status.

When the Meter display is "Off", automatic updating is disabled even if an automatic update interval is set. However, you can still use the remote command generator to send commands to the Fluke 45.

Save

Allows you to save the current session or the 100-line history buffer as "All interaction", "Commands only", or "Data only".

The session is saved to the currently named Recording File, which can be changed here or in the Setup menu on the QuickStart 45 window.

beGin

Allows you to "Start", "Pause", "Continue", and "Stop" a Program File.

In the Interact window, QuickStart 45 displays all commands, operator messages, and the Fluke 45's responses. (To limit the display to measurements from the Fluke 45, displayed in strip chart format, use the Chart Window.)

eXit

Leaves the session after prompting for a confirmation. Leaving clears the history buffer.

CHART WINDOW

The pull-down menus on the menu bar of the Chart window are described in the following paragraphs.

In the Chart window, the Meter display will always be on, even if it has been turned off in the Editor or Interact window.

Print Activates ("oN") or deactivates ("Off") printer. "Print_on" is shown when the printer is activated.

When the printer is activated, lines on the screen are sent to the printer.

show_F-keys Displays the function key assignments. The display disappears at the next keystroke.

Pressing a function key with a program assigned to it causes that program to be executed immediately. It is the equivalent of pressing ⟨*ALT*⟩ *g* (beGin), pressing "s" (Start), and entering a filename.

Display Sets the left and right boundaries of the strip chart display, and the number of lines of data between each scale display.

Changing the "Left boundary" and/or "Right boundary" allows you to zoom in or zoom out on the strip chart display.

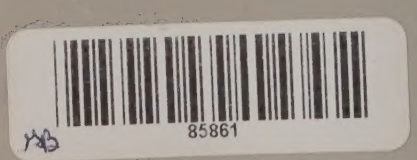
Save Allows you to "Start saving" and "Quit saving".

When "Start saving" is selected, "Save_on" is shown and measurements returned from the Fluke 45 are time-stamped and saved to the current Recording File.

beGin Allows you to "Start", "Pause", "Continue", and "Stop" the current Program File.

When a program is run, measurements taken by the Fluke 45 are displayed in strip chart format, with boundary and scale information.

eXit Leaves the Chart Window after prompting for a confirmation.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